10

COUNTERATTACK
DRINKING DRIVING
*A DECADE DOWN A SAFER ROAD*
1977-1987

# CounterAttack
# TRAFFIC RESEARCH PAPERS

1987

**Province of British Columbia**
Ministry of Attorney General

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A joint program of the Ministry of Attorney General and
the Insurance Corporation of British Columbia.

# CounterAttack
# TRAFFIC RESEARCH PAPERS

## 1987

**DRIVER ACCIDENT AND CHARGE RATES**
**THE ECONOMY AND ACCIDENT RATES**
**TRAFFIC ACCIDENT TYPES**
**TRAFFIC EPIDEMIOLOGY**
**THE COUNTERATTACK PROGRAM**

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## NOTE

The views expressed in this publication are entirely those of the writer and do not necessarily represent the views or policies of the Ministry of Attorney General or the Province of British Columbia.

## OTHER COUNTERATTACK RESEARCH PUBLICATIONS

CounterAttack Traffic Research Papers, 1986, Ministry of Attorney General, British Columbia, 1987.

This is a collection of eleven research papers on traffic-related issues compiled by the CounterAttack Program during 1986. Topics covered include: the relationships between driving record and traffic accidents; a comparison of injury-only and fatal traffic accidents; intersection traffic accidents; weather-related traffic accidents; the causes of fatal traffic accidents; the role of alcohol in fatal traffic accidents; and traffic accident epidemiology in terms of types, locations, victims and causes of casualty-producing traffic accidents. 222 pp. (see also Appendix B herein.)

CounterAttack Traffic Research Papers, 1985, Ministry of Attorney General, British Columbia, 1986.

This is a collection of eleven research papers on traffic-related issues completed by the CounterAttack Program during 1985. Topics covered include: influences on traffic accident frequency and severity; the media and police enforcement campaigns; drivers' characteristics and accident types; and causes and locations of traffic accidents. 190 pp.

CounterAttack Traffic Research Papers, 1984, Ministry of Attorney General, British Columbia, 1985.

This is a collection of eighteen research papers on traffic-related issues completed by the CounterAttack Program during 1984. Topics covered include: the CounterAttack Program history and evaluation; a discussion of the measurement of "alcohol involvement"; public opinion and knowledge of drinking-driving; the relationship between drivers's age and the causes of traffic accidents; the characteristics of victims of traffic accidents such as age, gender, and position in vehicle; the locations and causes of traffic accidents; the success of roadcheck enforcement "blitzes"; and epidemiological studies of restraint device use and vehicle occupant age. 207 pp.

Alcohol-Related Casualty Traffic Accidents in British Columbia, Ministry of Attorney General, British Columbia, 1984.

This document is a collection of studies which examined the characteristics of alcohol-related casualty traffic accidents in terms of their costs, causes, trends, locations, circumstances, and driver age and experience. 116 pp.

Driving While Impaired: Drivers, Charges and Outcomes, Ministry of Attorney General, British Columbia, 1983.

This study examined the court and driving records of 1,531 drivers charged with Driving While Impaired under the Canadian Criminal Code. These drivers were examined in terms of their demographic characteristics, past driving histories, method of apprehension, Blood Alcohol Content (BAC) at the time of arrest, and the outcome of their court appearances. In addition, their demographic and BAC characteristics were compared to those of a representative sample of drivers in British Columbia in order to assess any differences between those persons driving while impaired and those apprehended for same. 49 pp.

The Characteristics of Night-Time Drivers in British Columbia, Ministry of Attorney General, British Columbia, 1982.

This study examined the demographic characteristics, seat belt use and Blood Alcohol Content (BAC) of a representative sample of night-time drivers in B.C. 54 pp.

These publications are available by writing:

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February, 1988

# FOREWORD

This document is a collection of selected papers produced by the CounterAttack Program, most of which have been previously distributed on a limited basis. They have been selected for inclusion not only because they represent the sort of work done by CounterAttack research, but also because they address topics which have been of general interest not only to traffic safety researchers, but also to the police, policy makers, and the public. While each paper is complete unto itself, they have been organized into the following broad categories:

**DRIVER ACCIDENT AND CHARGE RATES**

**THE ECONOMY AND ACCIDENT RATES**

**TRAFFIC ACCIDENT TYPES**

**TRAFFIC EPIDEMIOLOGY**

**THE COUNTERATTACK PROGRAM**

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# EXECUTIVE SUMMARY

## DRIVER ACCIDENT AND CHARGE RATES

### Traffic Accidents and Convictions: Group Totals vs. Rates-While-Driving.

The results of this study can not be used to explain the gender and age differences found in traffic conviction rates, conviction types, and traffic accident rates. However, they do illustrate that these differences exist. More importantly, they clearly show how accident and conviction data can be examined from two valid perspectives - as totals for groups and as rates-while-driving. Using group totals, irrespective of driving exposure, young drivers, male drivers, and especially young male drivers are substantially over-represented in terms of both traffic accidents and traffic-related convictions. On the other hand, when accidents and convictions are considered in terms of their rates while the person is actually driving, older drivers and female drivers gain in importance, with the female drivers' traffic accident rate and rates for some convictions exceeding the male drivers' rates. Similarly, the older drivers' accident rate and rates on some convictions exceeded the younger drivers' rates when considered in terms of driving exposure.

The implications for policy makers and educators are clear. Although young male drivers are undeniably a legitimate focus for traffic accident countermeasures, they should not be targetted at the expense of drivers who drive less but have as high or higher accident rates - female and older drivers.

## THE ECONOMY AND ACCIDENT RATES

### Influences on Passenger Vehicle Casualty Accident Frequency and Severity: Unemployment, Driver Gender, Driver Age, Drinking Driving and Restraint Device Use.

A correlational examination of 84 consecutive months of data on the frequency and severity of passenger vehicle casualty traffic accidents, unemployment rates, drinking driving, restraint device use and the driver demographics of driver age and driver gender suggested the following: Increases in unemployment levels remove young male drivers from the driving population, which in turn reduces the frequency of drinking driving and increases the proportion of restraint device use in this population. These changes combine to reduce both the frequency of casualty accidents per million driven kilometers and the severity of these accidents. However, the apparent relationship between changes in restraint device use and the frequency and severity of casualty accidents, and the apparent relationship between changes in drinking driving and the frequency of casualty accidents can be, to a great extent, a function of unemployment-driven changes in driver demographics.

# TRAFFIC ACCIDENT TYPES

## Toward an Empirically-Derived Classification of Casualty Traffic Accident Patterns.

It is the purpose of this paper to examine the epidemiology of police-investigated casualty traffic accidents in order to see if they can be empirically grouped into a limited number of mathematically-defined patterns so that policy makers and educators can direct their efforts to develop countermeasures based on an assessment of what actually exists, as opposed to what happens to be topical.

A factor-analytic examination of 29 variables across 19,121 casualty-producing traffic accidents produced a 10-factor solution accounting for 56% of the variance. These factors reflect 10 separate accident patterns.

The following order of interpretation of the factors does not parallel their numeric order, but rather tries to interpret the factors in an associative order.

Factor 6 reflects a pattern of following-too-closely and/or driving-without-due-care multiple vehicle accidents producing somewhat severe damage.

Factor 1, like Factor 6 also involves following-too-closely and/or driving-without-due-care, but in addition includes failure-to-yield-right-of-way. It has a low-speed, low-damage intersection accident configuration involving a rear-end (following-too-close) or pedestrian (failure-to-yield) collision. Arguably, the driver may have been careless and inattentive, but was not trying to "run the light".

Factor 5 also represents intersection accidents, but this configuration represents those accidents where the driver consciously ignored a stop sign or signal.

Factor 8 is the third and final intersection accident configuration. It appears to be the product of a motorcycle/other motor vehicle conflict where one or the other driver turns improperly and/or fails to yield the right of way.

Factor 7, like Factor 8, appears to represent a motorcycle accident configuration. However, Factor 7 involves an inexperienced motorcyclist in a high-speed, single-vehicle run-off at a curve. Both of these patterns of motorcycle accidents have been identified elsewhere (Mercer, 1987).

Factor 9, like Factor 7 also involves driver inexperience, but Factor 9 reflects a traffic accident pattern of young, female drivers carrying passengers.

Unlike the young female driver pattern of Factor 9, the young male driver pattern of Factor 3 reflects driver histories involving previous non-alcohol-related traffic convictions, previous alcohol-related traffic convictions, and previous traffic accidents. As only driver characteristics loaded to any great extent, one might imagine that this factor involves drivers who would have traffic accidents under any circumstances.

Factor 4, like Factor 3, also involves drivers with a previous history of alcohol-related convictions. However, this factor appears to reflect an almost classic drinking-driving accident pattern: alcohol; carelessness and speed as causes; night-time occurrence; driver not wearing a restraint device; and severe damage to the vehicle.

Finally, Factors 2 and 10 appear to have very straightforward interpretations, with the former reflecting weather-related accidents and the latter bicycle accidents.

## Motorcycle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

Motorcycle accidents comprised about 8% of the total number of casualty traffic accidents in British Columbia between 1980 and 1986, and followed a seasonal cycle, peaking in the July-August period. In 1986, about 30% of these were single-vehicle accidents and the remainder involved a motorcycle and another motor vehicle.

Single-vehicle motorcycle casualty accidents tended to occur in the afternoon and evening periods, toward the end of the week, and in rural areas at a curve in the road. Typically, the motorcycle ran off the road to the right and the accident was caused by driving without due care (17%), alcohol (17%), speeding (15%), or inexperience (11%). The average age of the motorcycle rider was about 27 years, 95% were male, and 20% carried passengers.

On the other hand, multiple-vehicle motorcycle casualty accidents typically occurred in the afternoon and early evening, toward the end of the week, in business and residential areas, and at an intersection. Typically, the motorcycle was struck by a driver of another vehicle who was turning left and failed to yield the right of way. Similar to single-vehicle motorcycle accidents, the motorcyclists in these accidents averaged about 27 years of age, and about 95% were male. However, only about 14% carried passengers.

In terms of accident countermeasures, for single-vehicle motorcycle accidents, the role of inexperience might prove to be a useful focus, while motorcycle conspicuity and programs aimed at making other drivers aware of motorcycles could be a profitable direction in reducing multiple-vehicle motorcycle accidents.

## Bicycle/Motor Vehicle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

To summarize, between 1980 and 1986 bicycle/motor vehicle casualty-producing accidents comprised about 7% of all casualty traffic accidents in British Columbia, ranging from about 14% to 17% in July-August to about 2% to 4% in December-January. They tended to occur in urban areas, at intersections, in the

Spring-to-Fall period, in good weather, on weekdays, and in daylight. In the majority of these accidents there was no traffic control device in place, although in 20% there was a stop sign and in 13% there was a traffic light. About 10% were hit-and-run.

Typically, the casualty accident itself involved both the motor vehicle and the cyclist "going straight" and colliding at 90° at an intersection. The next most frequent accident configuration involved the motor vehicle making a right or left turn and colliding with the cyclist who was "going straight". The third most frequent bicycle/motor vehicle collision occurred when the motor vehicle was passing or "overtaking" the cyclist.

Turning to the primary factors contributing to these accidents (as determined by the investigating police officers), there were no contributing factors assigned to about 50% of the cyclists and about 60% of the motorists. Where contributing factors were indicated, for motorists the most frequent were Failure to Yield the Right of Way (37%), Driving Without Due Care and Attention (24%), and Visibility Impaired (7%) while for cyclists they were Driving Without Due Care and Attention (26%), Failure to Yield Right of Way (15%), and Wrong Side of Road (12%).

Cyclists involved in these bicycle/motor vehicle casualty accidents were three times as likely to be male than female, and had an average age of 22 years, with about 70% being over 16 years of age and half falling between 16 and 30 years. Head injuries or lower leg injuries were the most frequent outcomes for cyclists (27% each), followed by arm/shoulder injuries (22%). Of the 2,096 casualties, 17 or 0.8% were fatalities.

These results suggest two directions for countermeasures that might reduce bicycle/motor vehicle casualty accidents: public education on the legitimacy of cyclists as road users and public education emphasizing improvememts in bicycle conspicuity. Argument for the latter stems from the fact that for motorists in bicycle/motor vehicle collisions "visibility impaired" and for cyclists "defective headlights" are both contributing factors that could be reduced if the cyclist was more visible. However, it would appear that the larger (although perhaps less soluble) problem has to do with neither cyclists nor motorists recognizing that cyclists have similar rights and responsibilities on the public roads as do any other road users.

In more detail, for motorists in these accidents, Driving Without Due Care and Attention (24%) and Failure to Yield Right of Way (37%) suggest that the driver is not treating the bicycle in the same way that another motor vehicle would be treated. For cyclists, the contributing factors of Due Care (26%), Failure to Yield (15%), Wrong Side of Road (12%) and Signal Ignored (8%) suggest that they are not riding the bicycle with the same respect for other road users or for the laws that they would have if they were driving a motor vehicle. Indeed, the fact that about 70% of these cyclists are 16 years of age or older and probably have a drivers' licences, opens up possible driver licence-related as well as public education responses to this situation.

Finally, with the increasing costs of owning and operating a motor vehicle and with the increasing emphasis on fitness and "lifestyle" (e.g. triathlons), one would not expect these casualty traffic accidents to decrease in the future.

## Pedestrian/Motor Vehicle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

Pedestrian casualty traffic accidents comprise about 8% of all casualty traffic accidents, and were at their lowest frequency in Summer and highest in the Fall and early Winter. About half of these accidents occurred at intersections and half between intersections.

Regarding intersection pedestrian/motor vehicle casualty accidents, they tended to be urban, daylight phenomena, with 39% having occurred where there was no traffic control device, 20% where there was a stop sign and 38% where there was a stop light (of those, 66% on a green light, 26% on red, 8% on amber). A relatively high proportion (13.4%) were hit-and-run.

Where these intersection-related pedestrian accidents were classified as "motorist fault", the most common pattern was for the pedestrian to be struck by a vehicle proceeding straight through the intersection (65%), and the second most common pattern involved being struck by a vehicle making a left turn (19%). "Failure to yield right of way" (43.7%), "driving without due care" (23.9%), "weather" (7.1%) and "impaired visibility" (7.1%) were the most frequently cited contributing factors to these motorist-fault pedestrian/motor vehicle intersection casualty accidents. This type of accident comprised 38.6% of all pedestrian accidents in 1986.

Where the intersection-related pedestrian casualty traffic accident was classified as "pedestrian fault" the typical pattern involved the vehicle striking the pedestrian as he/she was crossing the road (77%), with 36% crossing against a signal, 29% crossing with no signal or crosswalk, and 19% crossing at a crosswalk. For the pedestrians, the most commonly cited contributing factors (after "pedestrian error" at 69.2%) were "alcohol" (19.7%), "ignoring traffic control device" (13.8%), and "failure to yield right of way" (14.2%). These accidents comprised 11.4% of all pedestrian/motor vehicle casualty accidents in 1986.

Turning to non-intersection pedestrian casualty traffic accidents, these tended more than their intersection-related counterparts to be less urban, and more associated with darkness and bad weather, although the majority of each type occurred in daylight and in good weather. A similarly high proportion (13.6%) were hit-and-run.

Where these non-intersection pedestrian casualty traffic accidents were classified as "motorist fault", typically the vehicle was "going straight" (68%) or "backing up" (13%) and the pedestrian was "crossing with no signal or crosswalk" (23%), "emerging from behind a vehicle" (16%), or "walking with traffic" (15%). In 29% of these accidents the pedestrian was struck "at 90°" to the vehicle, 16% "head-on" and 13% "side-swiped", while the three most commonly cited contributing factors assigned to the motorist were "driving without due care" (21%), "backing unsafely" (9.7%) and "alcohol" (8.4%). These accidents comprised 28.2% of all pedestrian casualty accidents in 1986.

Where non-intersection pedestrian casualty accidents were classified as "pedestrian fault", typically the vehicle was "going straight" (82%) and the pedestrian was "crossing with no signal or crosswalk" (39%) or "emerging from behind vehicle" (29%), resulting in collisions "at 90°" to the vehicle (54%) or "head-on" (18%). After "pedestrian error" (75.9%), the most commonly cited contributing factor for pedestrians was "alcohol" (24.8%), with no other factor exceeding 3% each. These accidents comprised 21.8% of all pedestrian casualty traffic accidents in 1986.

Turning to the age and gender of pedestrians and drivers in pedestrian/motor vehicle casualty accidents, for both groups there was a higher proportion of males than females in the "at fault" classifications, and the average age of drivers and pedestrians was about the same (34.9 yrs. vs. 33.6 yrs.). On the other hand, while the average ages of male and female drivers was about the same in both intersection and non-intersection "at fault" and "not at fault" classifications, for pedestrians, those in non-intersection accidents averaged about 3 years younger than those in intersection accidents (33.6 yrs. vs. 37.4 yrs.).

Overall, in 1986 there were 2,141 pedestrians injured and 88 killed, with 4% of those casualty accidents producing fatalities. A high proportion of the injuries were to the lower portion of the body.

Arguably, the public's perception of pedestrian traffic accidents is formed by the high-visibility, human-interest stories carried in the news media, and this perception probably includes the impression that these accidents involve children darting out from behind parked cars to be struck down by drinking drivers and/or the impression of innocent pedestrians being hit by motorists who run stop lights. However, as these results show, half of the pedestrian casualty traffic accidents did not occur at intersections, only 19% occurred at controlled intersections, the average age of injured pedestrians was about 34 years, the most common contributing factor for the pedestrian (but not the driver) was alcohol, and about 30% could be classified as the pedestrian's fault.

From the perspective of developing countermeasures to these accidents, programs should target both motorists and pedestrians and should distinguish between intersection and non-intersection accidents. Finally, the significant peak in the frequency of these accidents at the October/November period (just at the change from daylight savings time to standard time with the concommitant increase in darkness during the high-pedestrian volume evening rush hours) ought to be singled out for intensive public awareness campaigns.

## TRAFFIC EPIDEMIOLOGY

### Contributing Factors to Casualty Motor Vehicle Crashes in British Columbia, 1986.

This is a tabular presentation of some of the primary causes of casualty traffic accidents broken down by police reporting jurisdiction

### The Number of Injuries and Deaths Associated with Alcohol-related Traffic Accidents by Police Jurisdiction. British Columbia, 1986.

This report lists for each police reporting jurisdiction, the number of persons injured and killed in B.C. and the number of those injuries and deaths attributed to alcohol-related traffic accidents.

### Types and Locations of Casualty Motor Vehicle Crashes by Police Jurisdiction. British Columbia, 1986.

This is a tabular presentation of the locations of traffic accidents (i.e. intersection, bridge) and the types of traffic accidents (i.e. commercial vehicle, vehicle-pedestrian) broken down by police reporting jurisdiction.

### Canadian Criminal Code Traffic Charges by Police Jurisdiction. British Columbia, 1986.

This report deals with the number of persons charged under the Canadian Criminal Code (i.e. total Criminal Code, total Criminal Code Traffic, Criminal Code impaired) in British Columbia in 1986, by police reporting jurisdiction.

## THE COUNTERATTACK PROGRAM

### CounterAttack: British Columbia's Anti-drinking Driving Program.

A brief overview of the CounterAttack program outlining program components, mandate and current situation.

### CounterAttack Police Roadcheck Statistics. Spring, 1987 and Christmas, 1987.

Tabular presentation of police reported statistics (i.e. number of vehicles checked, charges laid) for both Spring and Christmas roadcheck campaigns.

### Drinking Driving Media Coverage, 1987.

A summary of the media coverage dealing with drinking driving and related issues in British Columbia during 1987. Media coverage is monitored to get a picture of how the public, through the media, see the drinking-driving problem.

### CounterAttack Research Data Sources: Traffic Accident Report Forms (MV104).

A discussion of the reliability and on validity of police-reported traffic accident data in British Columbia.

### CounterAttack Program Evaluation Guide for Community Volunteers.

This is a guide to help field-level CounterAttack volunteers to evaluate their community CounterAttack police roadcheck campaign.

### Traffic Safety in British Columbia: More than Drinking Driving CounterAttack.

This paper discusses how traffic safety concerns in British Columbia are evolving beyond a narrow focus on drinking driving to a more global perspective.

### Appendix A: Canadian Criminal Code and British Columbia Motor Vehicle Act Legislation on Drinking Driving.

Text ot Canadiam Criminal Code sections 237, 238 and 239 and text of B.C. Motor Vehicle Act sections 214, 220, 90, 91, and 92.

### Appendix B: Executive Summary of CounterAttack Traffic Research Papers, 1986.

# SECTION 1

## DRIVER ACCIDENT AND CHARGE RATES

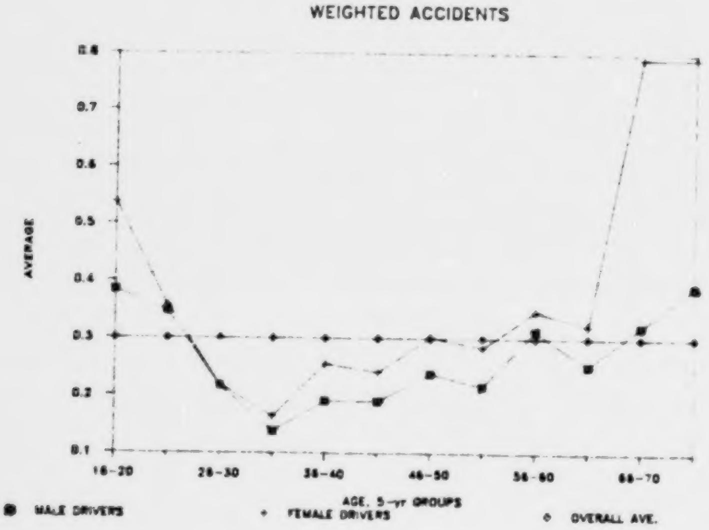
Traffic Accidents and Convictions: Group Totals *vs.* Rate-While-Driving.

## Traffic Accidents and Convictions: Group Totals *vs.* Rate-While-Driving.

## SUMMARY

The results of this study can not be used to explain the gender and age differences found in traffic conviction rates, conviction types, and traffic accident rates. However, they do illustrate that these differences exist. More importantly, they clearly show how accident and conviction data can be examined from two valid perspectives - as totals for groups and as rates-while-driving. Using group totals, irrespective of driving exposure, young drivers, male drivers, and especially young male drivers are substantially over-represented in terms of both traffic accidents and traffic-related convictions. On the other hand, when accidents and convictions are considered in terms of their rates while the person is actually driving, older drivers and female drivers gain in importance, with the female drivers' traffic accident rate and rates for some convictions exceeding the male drivers' rates. Similarly, the older drivers' accident rate and rates on some convictions exceeded the younger drivers' rates when considered in terms of driving exposure.

The implications for policy makers and educators are clear. Although young male drivers are undeniably a legitimate focus for traffic accident countermeasures, they should not be targetted at the expense of drivers who drive less but have as high or higher accident rates - female and older drivers.



## Traffic Accidents and Convictions: Group Totals vs. Rate-While-Driving

In the area of traffic accident countermeasures, researchers, policy makers and educators have emphasized the role of male drivers, young drivers, and especially young male drivers. The reason for this emphasis is that these drivers as a population or group tend to have more traffic accidents than do older drivers and female drivers (see for example, Cooper, 1987).

However, it has also been shown that young drivers and male drivers tend to drive more than do older drivers and female drivers (see Stewart and Sanderson, 1983). Consequently, while a population of drivers may have relatively frequent traffic accidents, as individuals they may be relatively safe drivers. For example, professional commercial vehicle drivers as a group tend to have a high number of traffic accidents and traffic law convictions (Mercer, 1986), yet it can be argued that their greater exposure to driving makes them safer than average drivers per mile or hour driven.

The difference between traffic accident involvement for drivers taken as group totals, as opposed to drivers' accident rates while actually driving, can be a problem for those allocating countermeasure resources. That is, should groups of drivers that have a large absolute number of accidents be targetted for educational programs even if the individuals in those groups are relatively safe per-hour drivers, or should those groups that have the highest frequency of accidents per hour on the road be targetted, irrespective of the proportion of accidents they contribute to the total accident volume? Clearly, in an environment of limited resources, a balance must be struck.

Consequently, in an effort to assist policy makers and educators in their decision-making concerning which groups to target for traffic accident countermeasures, this paper will examine drivers' traffic accident and traffic conviction records both in terms of absolute numbers and numbers weighted by age and gender for driving exposure. (By weighting for driving exposure, accident and conviction rates-while-driving can be compared with accident and conviction rates as group totals.)

## METHOD

Traffic accident and conviction data were drawn from a random sample of 9,273 British Columbia driver records taken from the B.C. Ministry of Transportation and Highways database in December, 1984. This sample size represents an accurate picture of the approximately 2 million record database with about a 1% error. As the codes for recording offences were changed in June, 1980, all records of offences and traffic accidents prior to that date were deleted, producing a time span of 55 months (June, 1980 - December, 1984) for the data. Conviction records were supplied to the Ministry through the court system, while accident records came from accident reports (MV104) for police-investigated and self-reported traffic accidents.

Age and gender exposure weights were taken from Stewart and Sanderson (1983) and can be found in Table 3. These weights were applied to total recorded traffic accidents and convictions as well as to the twelve most common convictions.

## RESULTS AND DISCUSSION

From Table 1 it can be seen that male drivers had 72% of the total number of reported accidents, and of the accidents involving male drivers, males under 31 years of age (who comprise about 30% of the male driving population) had about half of the accidents. Similarly, from Table 2 it can be seen that male drivers had 81% of the total convictions, and of the convictions involving male drivers, those under 31 years of age had 56%. However, from Table 3 it can be seen that male drivers have about two-and-a-half times the driving exposure as female drivers, while drivers in the 21-25 year old group have over twice the exposure as those in the 56-65 year old group and over five times the exposure as those in the 65 and over group.

Table 4 shows, for both male and female drivers, the mean (average) and standard deviation for total accidents, total convictions, and for the following common convictions: speeding, failure to use a restraint device, failure to produce a valid drivers' licence, speeding in a school zone, disobeying a sign or signal (eg. yield sign), disobeying a stop sign, disobeying a red light, driving while impaired, excessive speed for conditions, a 24 hour licence suspension for driving while impaired (generally given when blood alcohol is not sufficient to charge under the

### Table 1
### Total Number of Accidents by Gender and Age

| | Total Number of Accidents | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Total | |
| | N | % | N | % | N | % |
| GENDER | | | | | | |
| Male | 1,953 | 72% | | | | |
| Female | | | 743 | 28% | | |
| | | | | | 2,696 | 100% |
| AGE | | | | | | |
| 16-20 yrs. | 112 | 6% | 46 | 6% | 158 | 6% |
| 21-25 yrs. | 479 | 25% | 156 | 21% | 635 | 24% |
| 26-30 yrs. | 347 | 18% | 122 | 16% | 469 | 17% |
| 31-35 yrs. | 171 | 9% | 79 | 11% | 250 | 9% |
| 36-40 yrs. | 174 | 9% | 82 | 11% | 256 | 9% |
| 41-45 yrs. | 125 | 6% | 55 | 7% | 180 | 7% |
| 46-50 yrs. | 94 | 5% | 43 | 6% | 137 | 5% |
| 51-55 yrs. | 103 | 5% | 36 | 5% | 139 | 5% |
| 56-60 yrs. | 100 | 5% | 29 | 4% | 129 | 5% |
| 61-65 yrs. | 83 | 4% | 28 | 4% | 111 | 4% |
| 66-70 yrs. | 38 | 2% | 25 | 3% | 63 | 2% |
| 70+ yrs. | 127 | 7% | 42 | 6% | 169 | 6% |
| Total | 1,953 | 100% | 743 | 100% | 2,696 | 100% |

## Table 2
## Total Number of Convictions by Gender and Age

| | Total Number of Convictions | | | | | |
|---|---|---|---|---|---|---|
| | Male | | Female | | Total | |
| | N | % | N | % | N | % |
| GENDER | | | | | | |
| Male | 8,770 | 81% | | | | |
| Female | | | 2,118 | 19% | | |
| | | | | | 10,888 | 100% |
| AGE | | | | | | |
| 16-20 yrs. | 523 | 6% | 91 | 4% | 614 | 6% |
| 21-25 yrs. | 2,629 | 30% | 510 | 24% | 3,139 | 29% |
| 26-30 yrs. | 1,760 | 20% | 432 | 20% | 2,192 | 20% |
| 31-35 yrs. | 942 | 11% | 288 | 14% | 1,230 | 11% |
| 36-40 yrs. | 826 | 9% | 293 | 14% | 1,119 | 10% |
| 41-45 yrs. | 585 | 7% | 164 | 8% | 749 | 7% |
| 46-50 yrs. | 358 | 4% | 94 | 4% | 452 | 4% |
| 51-55 yrs. | 313 | 4% | 74 | 3% | 387 | 4% |
| 56-60 yrs. | 270 | 3% | 65 | 3% | 335 | 3% |
| 61-65 yrs. | 230 | 3% | 41 | 2% | 271 | 2% |
| 66-70 yrs. | 145 | 2% | 34 | 2% | 179 | 2% |
| 70+ yrs. | 189 | 2% | 32 | 2% | 221 | 2% |
| Total | 8,770 | 100% | 2,118 | 100% | 10,888 | 100% |

## Table 3
## Proportions of Exposure used to Weight Variables

| Proportions (weights) | | Sample Size | | | | | |
|---|---|---|---|---|---|---|---|
| | | Male | | Female | | Total | |
| | | N | % | N | % | N | % |
| GENDER | | | | | | | |
| Male | 0.711 | 5,353 | 58% | | | | |
| Female | 0.289 | | | 3,920 | 42% | | |
| | | | | | | 9,273 | 100% |
| AGE | | | | | | | |
| 16-20 yrs. | 0.067 | 260 | 5% | 184 | 5% | 444 | 5% |
| 21-25 yrs. | 0.133 | 609 | 11% | 466 | 12% | 1,075 | 12% |
| 26-30 yrs. | 0.132 | 707 | 13% | 617 | 16% | 1,324 | 14% |
| 31-35 yrs. | 0.132 | 557 | 10% | 518 | 13% | 1,075 | 12% |
| 36-40 yrs. | 0.1015 | 530 | 10% | 449 | 11% | 979 | 11% |
| 41-45 yrs. | 0.1015 | 379 | 7% | 319 | 8% | 698 | 8% |
| 46-50 yrs. | 0.081 | 323 | 6% | 248 | 6% | 571 | 6% |
| 51-55 yrs. | 0.081 | 338 | 6% | 224 | 6% | 562 | 6% |
| 56-60 yrs. | 0.058 | 324 | 6% | 211 | 5% | 535 | 6% |
| 61-65 yrs. | 0.058 | 326 | 6% | 208 | 5% | 534 | 6% |
| 66-70 yrs. | 0.0255 | 269 | 5% | 175 | 4% | 444 | 5% |
| 70+ yrs. | 0.0255 | 731 | 14% | 301 | 8% | 1,032 | 11% |
| Total | | 5,353 | 100% | 3,920 | 100% | 9,273 | 100% |

General Weighting Formula:

`observation*(1/(2*gender wt.))*(1/(12*age wt.))`

Exposure weights taken from Stewart and Sanderson, 1983.

Table 4
A Comparison of Male and Female Drivers' Traffic Conviction and Accident Records
British Columbia, June 1980 - December 1984

| # CONVICTIONS | Male Driver N= 5,353 | | Female Driver N= 3,920 | | Overall | | t Value | 2-tailed Probability |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | | |
| Speeding | 0.810 | 1.444 | 0.281 | 0.721 | 0.587 | 1.222 | 23.16 | 0.000 |
| Restraint device | 0.112 | 0.379 | 0.037 | 0.206 | 0.080 | 0.320 | 12.18 | 0.000 |
| No valid licence | 0.086 | 0.410 | 0.013 | 0.127 | 0.054 | 0.324 | 12.22 | 0.000 |
| Speeding in school zone | 0.059 | 0.266 | 0.047 | 0.223 | 0.054 | 0.248 | 2.57 | 0.010 |
| Disobey sign/ signal | 0.063 | 0.286 | 0.029 | 0.183 | 0.048 | 0.248 | 6.92 | 0.000 |
| Stop sign | 0.062 | 0.281 | 0.022 | 0.156 | 0.045 | 0.236 | 8.91 | 0.000 |
| Red light | 0.056 | 0.261 | 0.018 | 0.145 | 0.040 | 0.220 | 8.99 | 0.000 |
| Driving while impaired | 0.056 | 0.275 | 0.009 | 0.118 | 0.036 | 0.223 | 10.92 | 0.000 |
| Excess speed for conditions | 0.048 | 0.250 | 0.009 | 0.091 | 0.031 | 0.201 | 10.58 | 0.000 |
| 24 hr. licence suspensions | 0.043 | 0.248 | 0.006 | 0.083 | 0.027 | 0.196 | 10.07 | 0.000 |
| No insurance | 0.038 | 0.232 | 0.006 | 0.075 | 0.024 | 0.184 | 9.74 | 0.000 |
| Yellow light | 0.032 | 0.187 | 0.008 | 0.091 | 0.021 | 0.154 | 7.94 | 0.000 |
| All convictions | 1.638 | 2.667 | 0.540 | 1.126 | 1.174 | 2.221 | 27.01 | 0.000 |
| | | | | | | | | |
| Total # of accidents | 0.364 | 0.720 | 0.189 | 0.480 | 0.290 | 0.636 | 14.05 | 0.000 |

## Table 5
## A Comparison of Male and Female Drivers' Traffic Conviction and Accident Records Weighted for Exposure British Columbia, June 1980 - December 1984

| # CONVICTIONS | Male Driver N= 5,353 | | Female Driver N= 3,920 | | Overall | | t Value | 2-tailed Probability |
|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | | |
| Speeding | 0.487 | 0.876 | 0.397 | 1.061 | 0.449 | 0.959 | 4.31 | 0.000 |
| Restraint device | 0.074 | 0.287 | 0.055 | 0.339 | 0.066 | 0.310 | 2.86 | 0.004 |
| No valid licence | 0.044 | 0.213 | 0.017 | 0.167 | 0.033 | 0.196 | 7.03 | 0.000 |
| Speeding in school zone | 0.042 | 0.213 | 0.072 | 0.389 | 0.054 | 0.301 | -4.31 | 0.000 |
| Disobey sign/ signal | 0.041 | 0.211 | 0.044 | 0.297 | 0.042 | 0.251 | -0.53 | 0.598 |
| Stop sign | 0.037 | 0.180 | 0.033 | 0.274 | 0.035 | 0.225 | 0.85 | 0.397 |
| Red light | 0.039 | 0.209 | 0.026 | 0.217 | 0.033 | 0.212 | 2.90 | 0.004 |
| Driving while impaired | 0.033 | 0.186 | 0.016 | 0.208 | 0.026 | 0.196 | 4.15 | 0.000 |
| Excess speed for conditions | 0.029 | 0.170 | 0.012 | 0.155 | 0.022 | 0.164 | 5.02 | 0.000 |
| 24 hr. licence suspensions | 0.024 | 0.148 | 0.008 | 0.115 | 0.018 | 0.135 | 5.85 | 0.000 |
| No insurance | 0.022 | 0.143 | 0.008 | 0.133 | 0.059 | 0.139 | 4.54 | 0.000 |
| Yellow light | 0.019 | 0.134 | 0.012 | 0.135 | 0.016 | 0.134 | 2.82 | 0.005 |
| All convictions | 1.007 | 1.580 | 0.796 | 1.709 | 0.918 | 1.638 | 6.05 | 0.000 |
| | | | | | | | | |
| Total # of accidents | 0.265 | 0.598 | 0.343 | 1.150 | 0.298 | 0.876 | -3.87 | 0.000 |

Criminal Code), driving with no insurance, and disobeying a yellow light. Student's t-tests were done between the genders and all showed male drivers as a group to have had significantly higher average accident and conviction rates than did the female drivers as a group.

Table 5 shows the same comparisons as Table 4, except the data were first weighted for exposure levels in order to illustrate accident and conviction rates-while-driving. From these data it can be seen that the magnitude of the differences between the genders decreased substantially on all measures, except for those where the direction of the differences reversed entirely. To illustrate, the statistically significant difference between genders disappeared for both disobey sign or signal convictions and stop sign convictions, while for speeding in school zone convictions, the average conviction rate for females exceeded the average for males. However, the single most important result shown in Table 5 is that, after driving exposure was taken into consideration, female drivers had a statistically significantly higher level of traffic accident involvement than did male drivers.

Figures 1a and 1b through 7a and 7b compare male drivers and female drivers using unweighted and weighted averages in terms of 5-year age groupings for: total convictions, speeding convictions (sum of speeding, speeding in school zone and excessive speed for conditions), disobey sign/light (sum of red light, yellow light, sign/signal and stop sign convictions), alcohol-related convictions (sum of driving while impaired and 24-hr.

Figure 1a: NUMBER OF CONVICTIONS

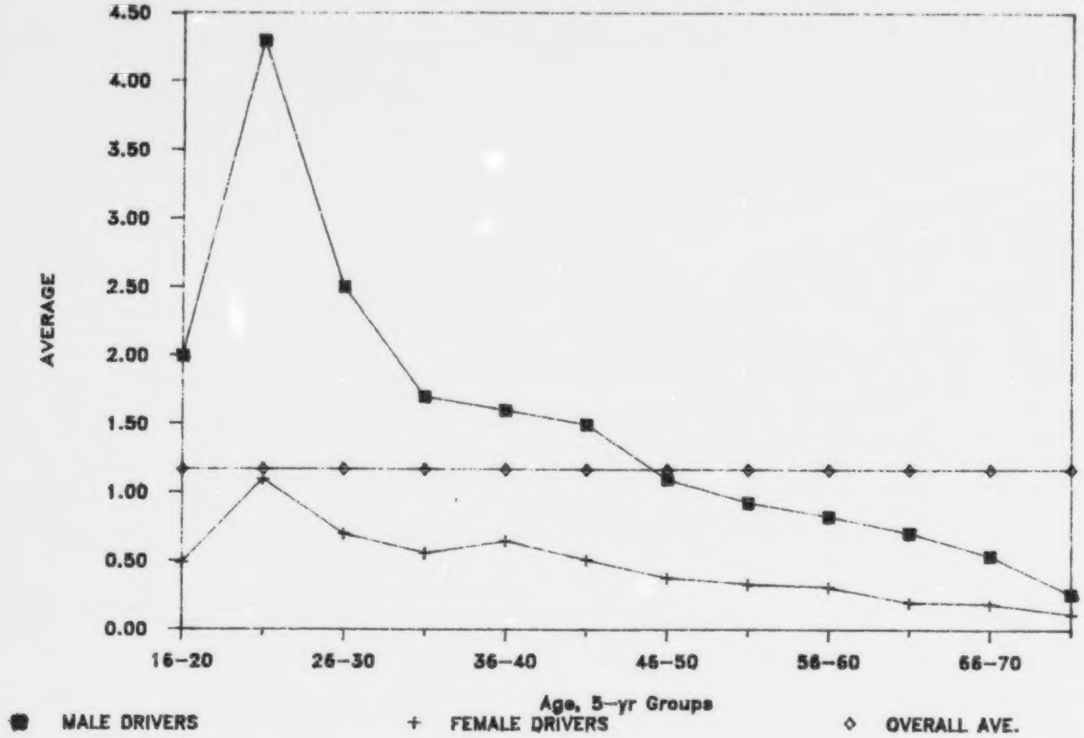


Figure 1b: WEIGHTED CONVICTIONS

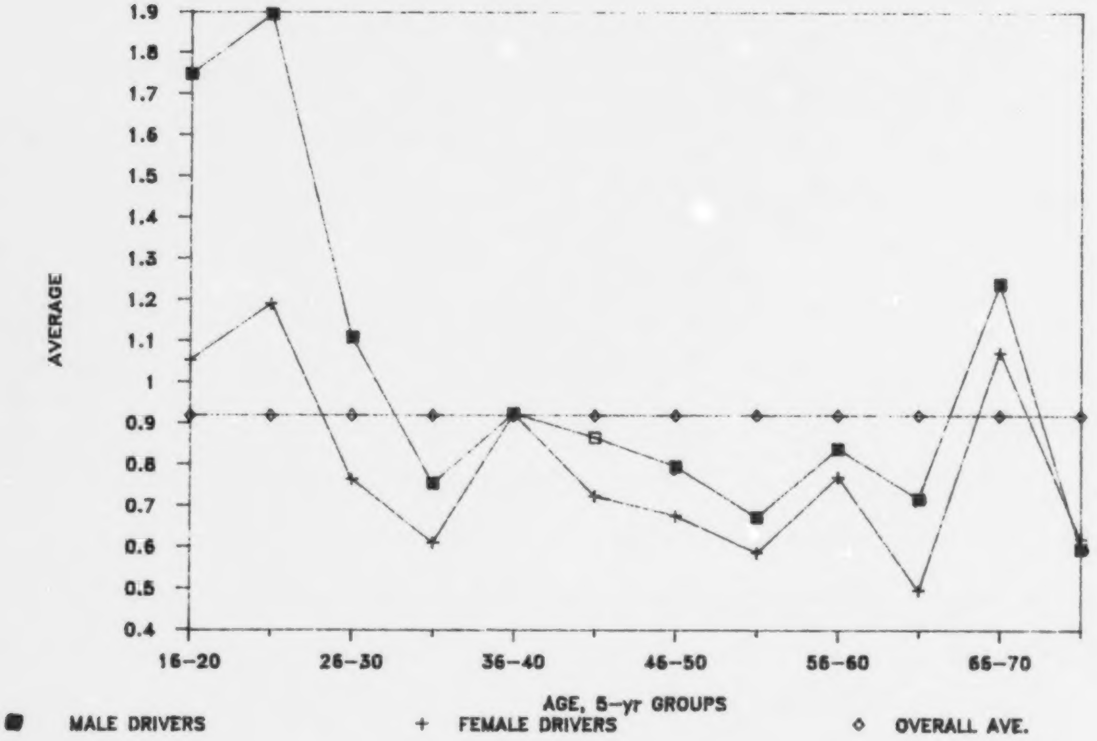


Figure 2a: # SPEEDING CONVICTIONS

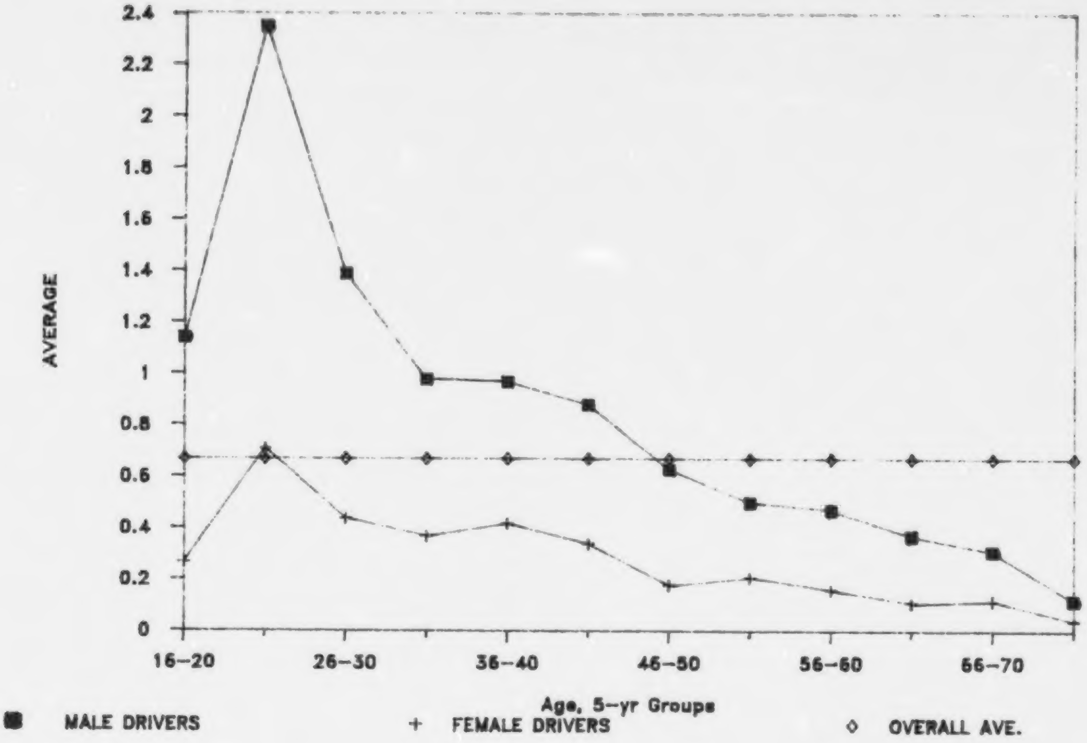


Figure 2b: WEIGHTED SPEEDING CONVICTIONS

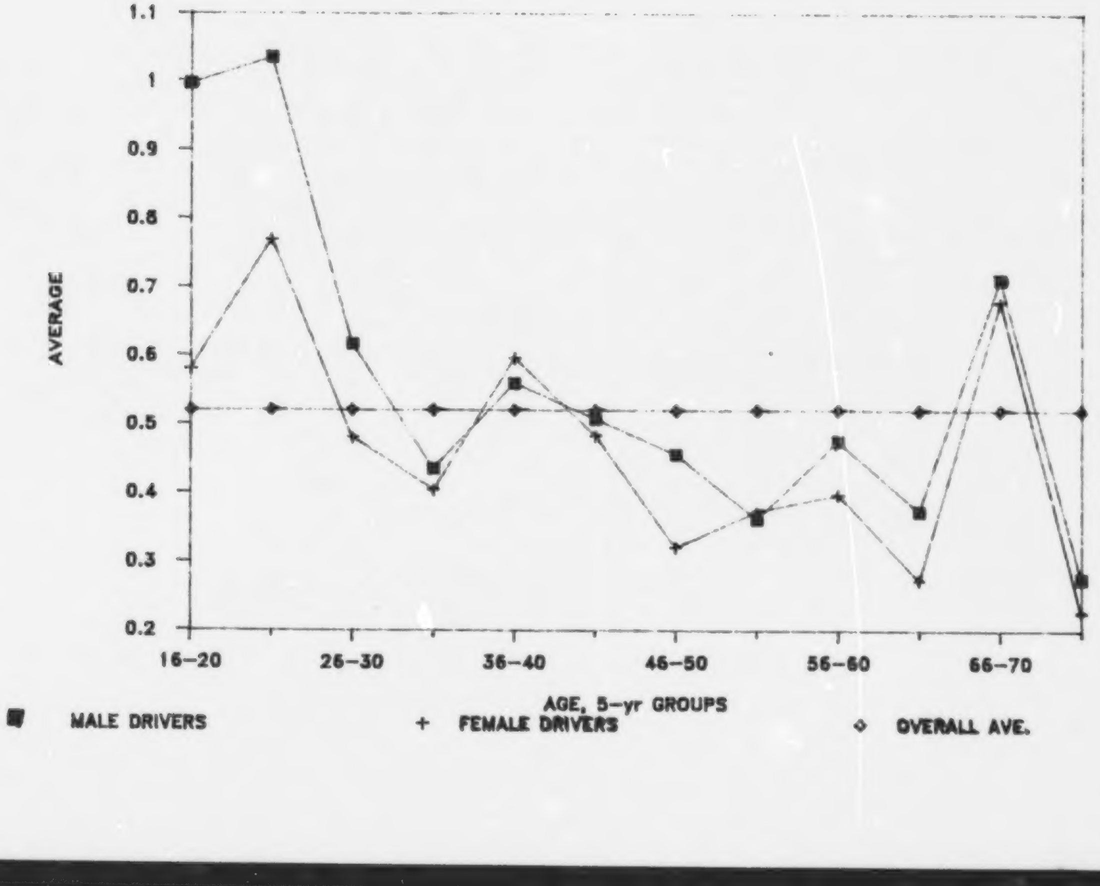


Figure 3a: # DISOBEY SIGN/LIGHT CONV.

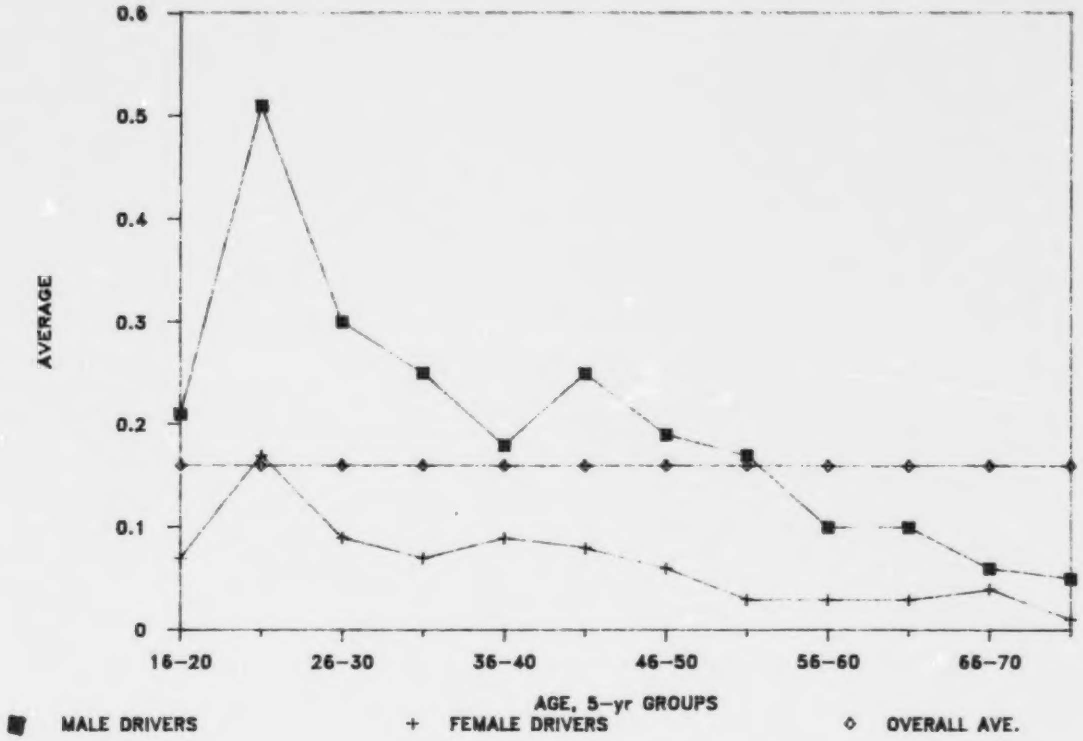


Figure 3b: WEIGHTED DISOBEY SIGN/LIGHT CONV.

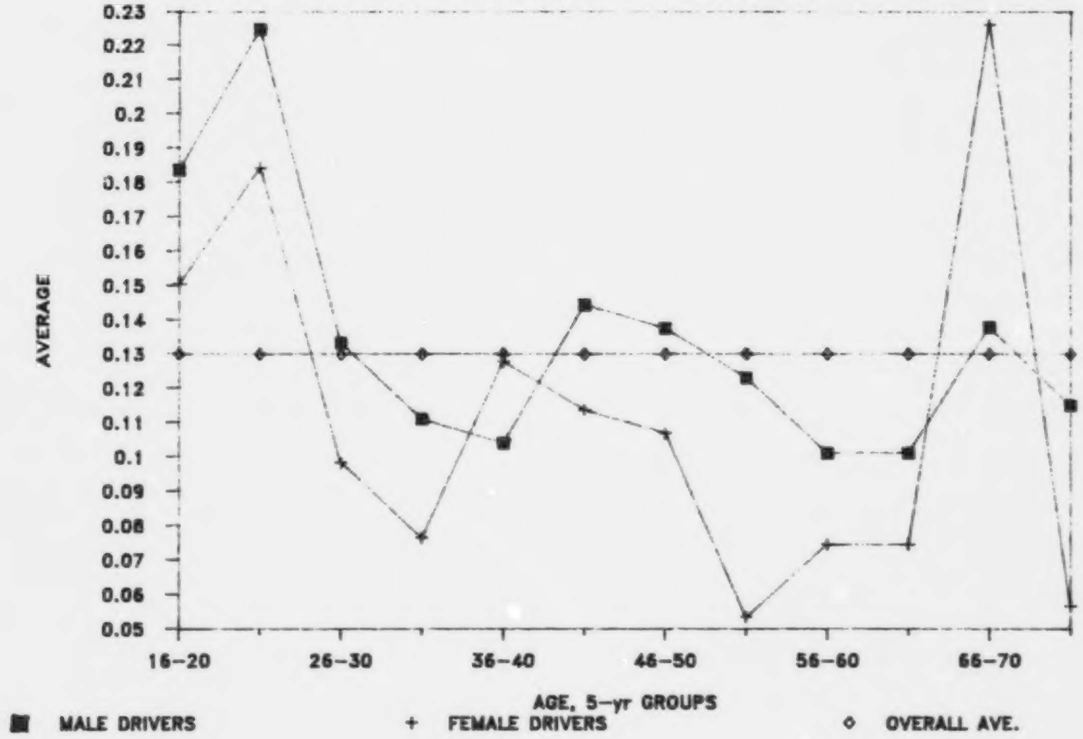


Figure 4a: # ALCOHOL RELATED CONVICTIONS

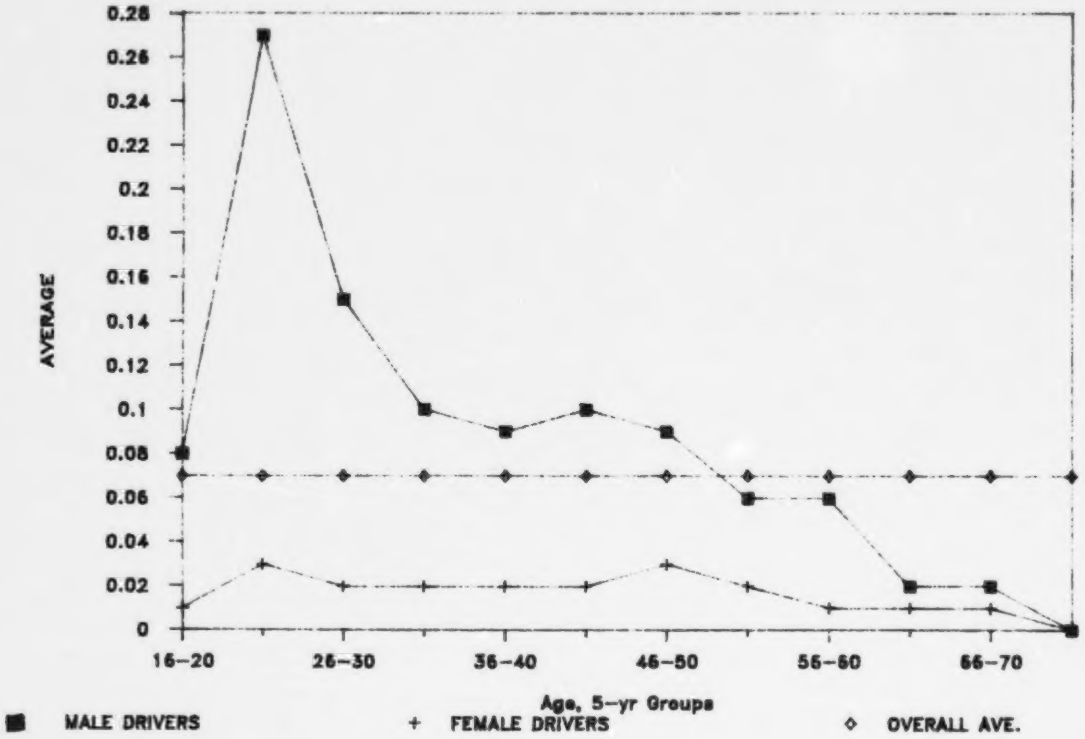


Figure 4b: WEIGHTED ALC. RELATED CONV.

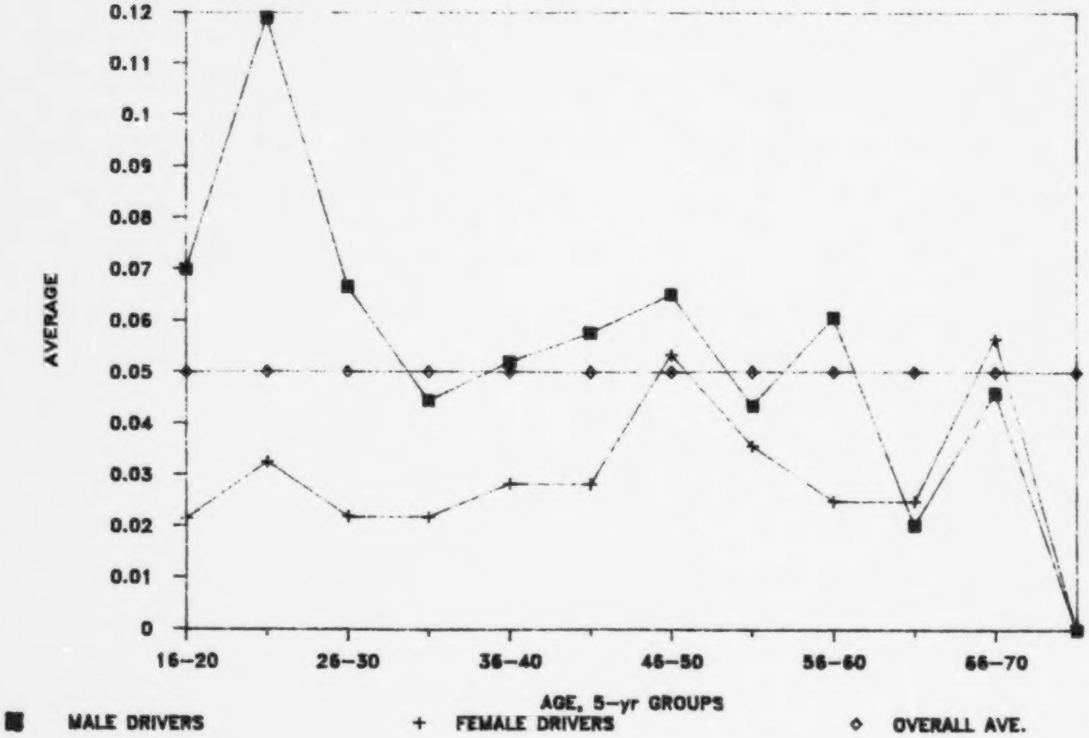


Figure 5a: # NO INSURANCE/LICENCE CONV.

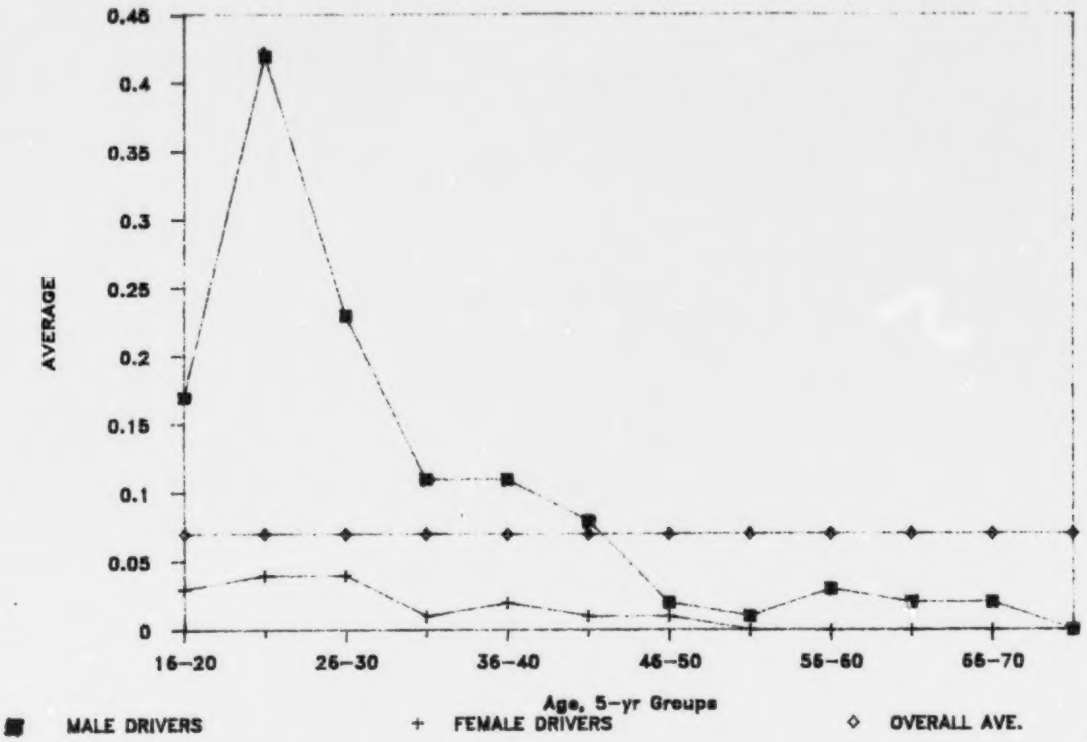


Figure 5b: WEIGHTED NO INSURANCE/LICENCE CONV.

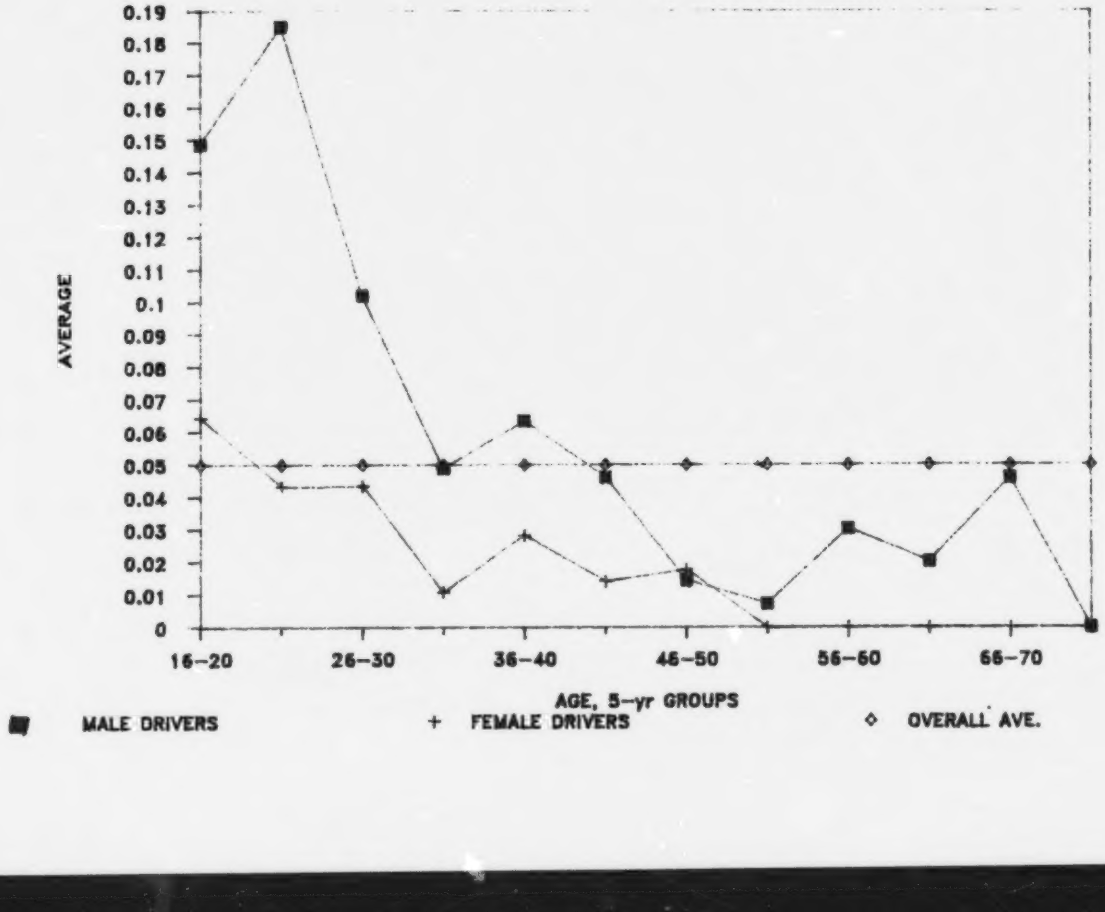


Figure 6a: # RESTRAINT DEVICE CONV.

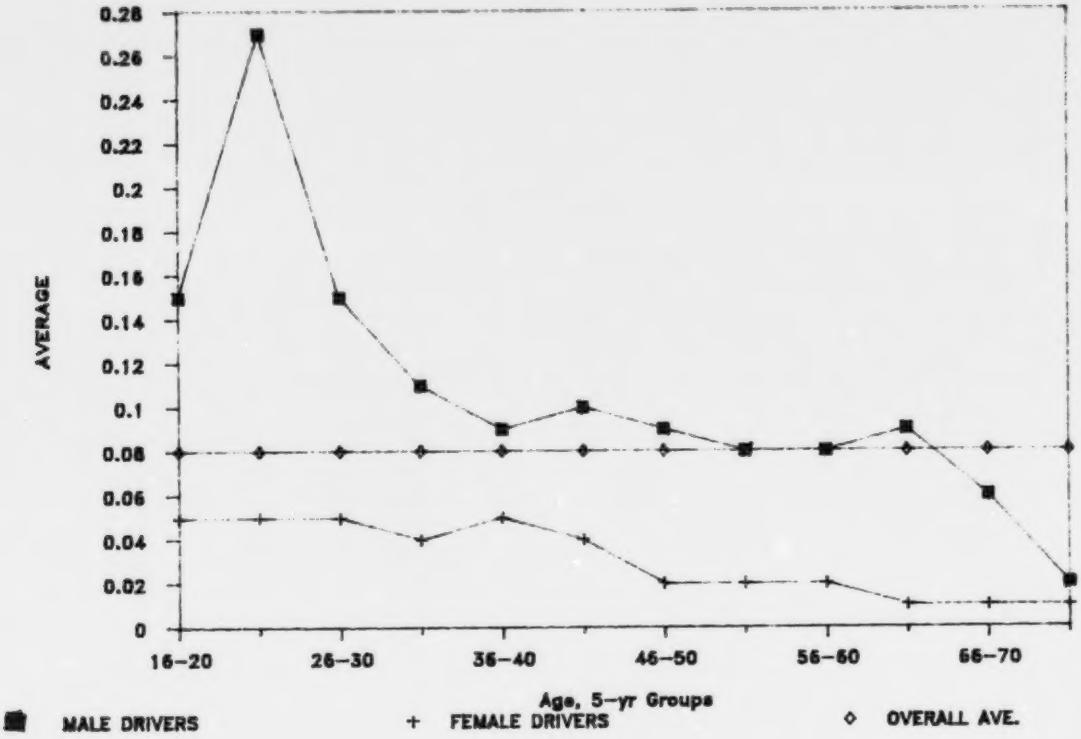


Figure 6b: WEIGHTED RESTRAINT DEVICE USE

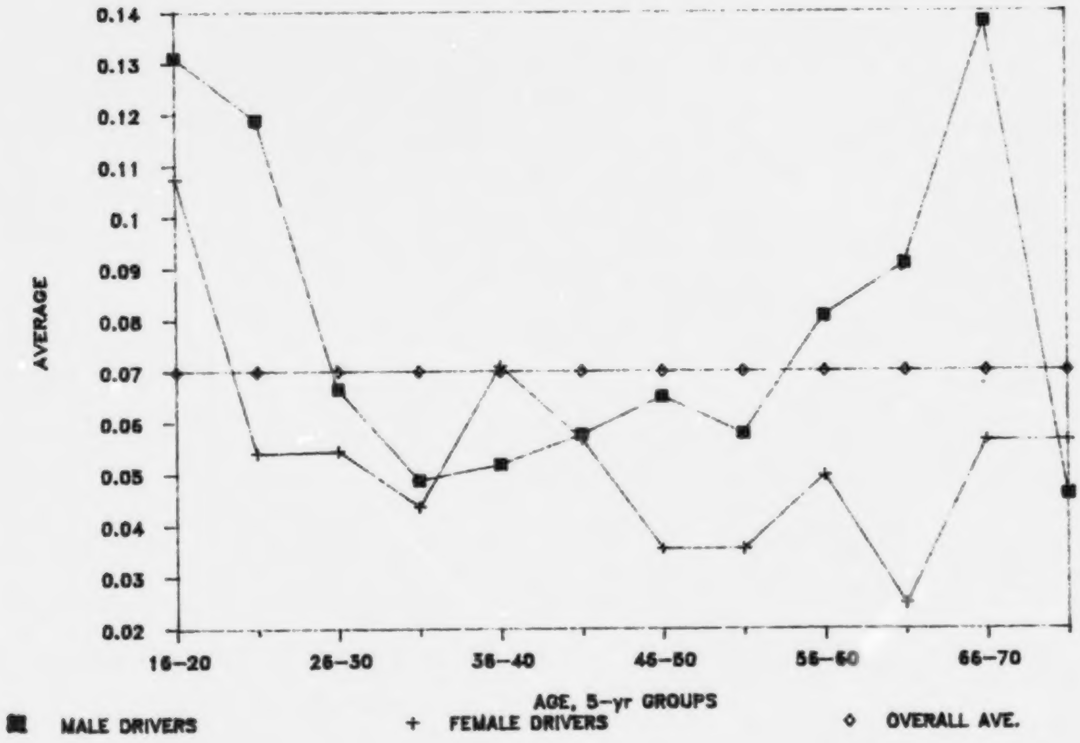


Figure 7a: NUMBER OF ACCIDENTS

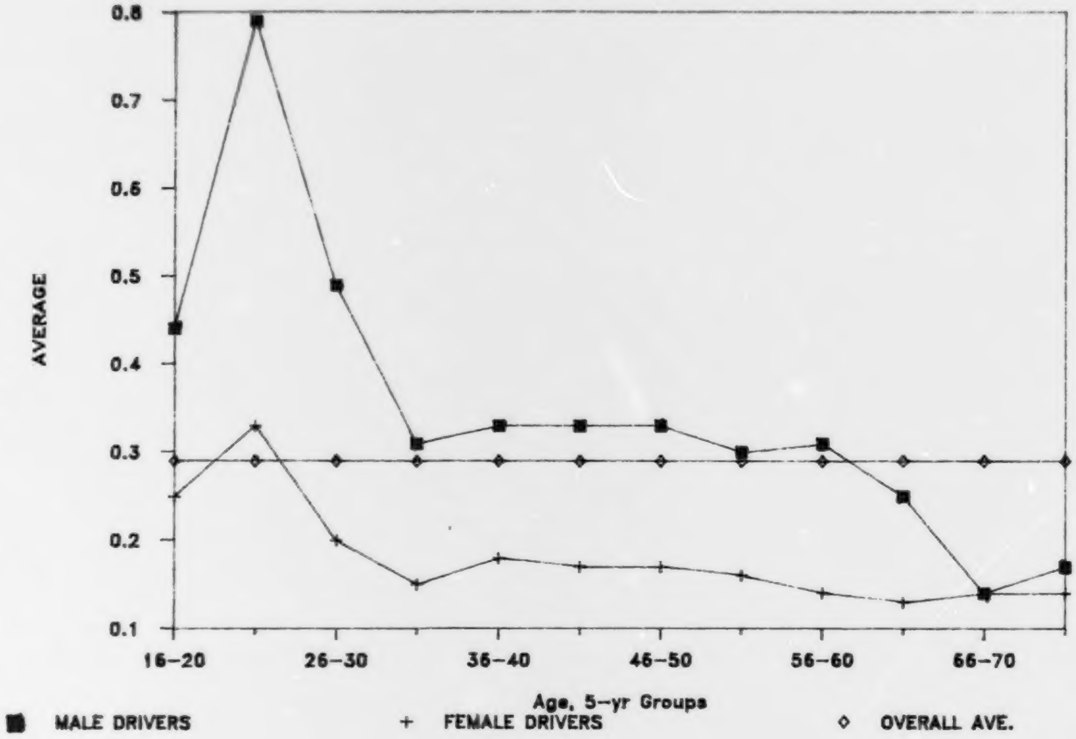
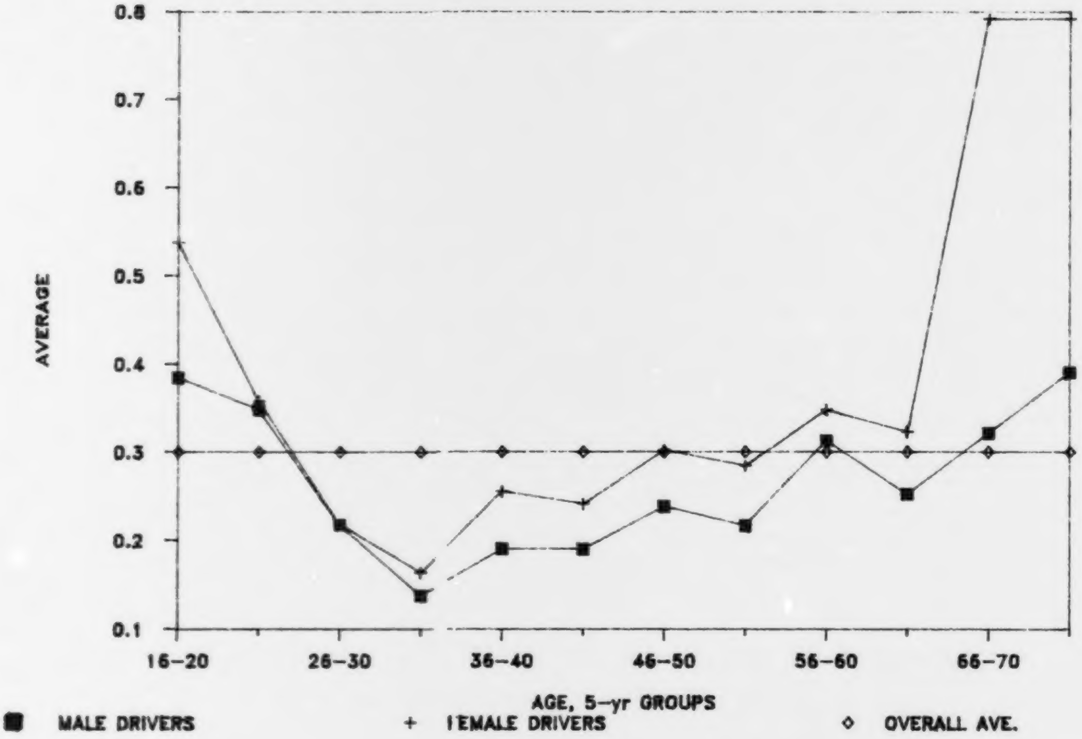


Figure 7b: WEIGHTED ACCIDENTS



licence suspension convictions), the sum of no insurance and no licence convictions, restraint device convictions, and total accidents. Additionally, each graph shows the average value for the variable. It should be noted that the drop in the 16-20 year old group has to do in some portion with the cumulative nature of these measures. That is, as the driving record data are averaged over a 55 month period, a 20 year old driver who has been driving for 5 years will have had longer to accumulate a record than a 19-year old driver who has been driving only for four years, and so on down to a 16-year old in his/her first month of driving. Similarly, regarding the sharp decrease in the average values of all variables for those in the 71+ year age group, as driver's licences are issued every 5 years, a relatively high portion of those in that group are no longer driving due to illness or death. Therefore the 71+ group does not fully represent active drivers in that age category. Clearly these two measurement problems will artificially reduce the levels for the oldest and youngest age groups, and ought to be kept in mind when interpreting these data.

As would be expected, the exposure weighting increased the presence of female and older drivers in all of the weighted graphs. Further, young male drivers had the highest average conviction rates for all of the weighted as well as for all of the unweighted conviction data variables.

In more detail, turning to the total average number of convictions by age and gender as illustrated in Figure 1a, all age groups of female drivers had rates below the overall average, while the values for the males were above the overall average for all age groups younger than 51. However, when conviction rates-while-driving are examined using the data weighted for exposure, Figure 1b shows that young females (16-25 years) and older females (66-70 years) had conviction rates above the overall average. Further, only males under 31 years of age (as opposed to those under 51 years) and those in the 66-70 year group had conviction rates above the overall average. That is, both young males and young females, as well as older (66-70 years) male and female drivers accumulated higher than average conviction rates when viewed in terms of rates-while-driving as opposed to rates as group totals.

Turning to specific conviction types, a comparison of Figure 2a with 2b and a comparison of Figure 3a with 3b both show a similar pattern of change from unweighted to weighted data as did Figures 1a and 1b. That is, speeding and sign/signal convictions appear to be primarily middle-aged and younger male phenomena when examined in terms of group totals. However when examined in terms of conviction rates-while-driving, both young male and female drivers and male and female drivers between 66 and 70 had the highest conviction rates.

On the other hand, alcohol-related convictions and no insurance/licence convictions appear to be primarily young to middle-aged male driver phenomena, irrespective of whether or not the data are weighted for driving exposure, as can be seen from Figures 4a, 4b, 5a and 5b.

Finally, although restraint device convictions also tended to be a male driver phenomenon for both the unweighted and weighted data, the conviction rate of the older male driver was substantially increased in the weighted data, with rates for males rising steadily from 31 to 70 years, as can be seen from Figures 6a and 6b.

Turning to average traffic accident frequencies for each gender age group, Figure 7a shows that, in terms of totals irrespective of amount of driving exposure, young drivers, male drivers, and especially the young male drivers groups had relatively high accident frequencies. However, from Figure 7b it can be seen that, when the data are weighted to reflect driving exposure, female drivers had higher accident rates than did male drivers, and older drivers had as high or higher accident rates than younger drivers. Generally, for both genders the weighted accident rates gradually fell from the 16-20 year old group down to the 31-35 group, and then increased steadily to the oldest group. In particular, older (61+ years) female drivers had the highest accident rate (perhaps recent widows who had not driven frequently for a number of years?)

The results of this study can not be used to explain the gender and age differences found in traffic conviction rates, conviction types, and traffic accident rates. However, they do illustrate that these differences exist. More importantly, they clearly show how accident and conviction data can be examined from two valid perspectives - as totals for groups and as rates-while-driving. Using group totals, irrespective of driving exposure, young drivers, male drivers, and especially young male drivers are substantially over-represented in terms of both traffic accidents and traffic-related convictions. On the other hand, when accidents and convictions are considered in terms of their rates while the person is actually driving, older drivers and female drivers gain in importance, with the female drivers' traffic accident rate and rates for some convictions exceeding the male drivers' rates. Similarly, the older drivers' accident rate and rates on some convictions exceeded the younger drivers' rates when considered in terms of driving exposure.

The implications for policy makers and educators are clear. Although young male drivers are undeniably a legitimate focus for traffic accident countermeasures, they should not be targetted at the expense of drivers who drive less but have as high or higher accident rates - female and older drivers.

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# SECTION 2

## THE ECONOMY AND ACCIDENT RATES

Influences on Passenger Vehicle Casualty Accident Frequency and Severity: Unemployment, Driver Gender, Driver Age, Drinking Driving and Restraint Device Use.

# Influences on Passenger Vehicle Casualty Accident Frequency and Severity: Unemployment, Driver Gender, Driver Age, Drinking Driving and Restraint Device Use.

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# INFLUENCES ON PASSENGER VEHICLE CASUALTY ACCIDENT FREQUENCY AND SEVERITY: UNEMPLOYMENT, DRIVER GENDER, DRIVER AGE, DRINKING DRIVING AND RESTRAINT DEVICE USE

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**Abstract**—A correlational examination of 84 consecutive months of data on the frequency and severity of passenger vehicle casualty traffic accidents, unemployment rates, drinking driving, restraint device use and the driver demographics of driver age and driver gender suggested the following: Increases in unemployment levels remove young male drivers from the driving population, which in turn reduces the frequency of drinking driving and increases the proportion of restraint device use in this population. These changes combine to reduce both the frequency of casualty accidents per million driven kilometers and the severity of these accidents. However, the apparent relationship between changes in restraint device use and the frequency and severity of casualty accidents, and the apparent relationship between changes in drinking driving and the frequency of casualty accidents can be, to a great extent, a function of unemployment-driven changes in driver demographics.

## INTRODUCTION

Variations over time in the severity of traffic accidents and the frequency of these accidents per driven kilometer can come from at least two sources: changes in driver behaviour and attitudes, and changes in the demographic composition of the driving population. To elaborate on the former, it is possible that decreases in accident severity and accident frequency per driven kilometer could be attributed to increased restraint device use or to decreased drinking driving by the driving population as a whole. For example, Christian [1984] found that increased restraint device use in Australia led to decreases in traffic injury severity. On the other hand, Jonah and Lawson [1984] found that, while restraint device use increased with legislation requiring the use of same, this did not always produce reductions in fatality and injury rates. By way of explanation they suggested that perhaps it was mainly the safer drivers who obeyed the laws.

Changes in traffic accident severity and frequency could also stem from changes in the demographic characteristics of the driving population. If the group of drivers most likely to be in accidents were proportionally reduced, then one would expect reduction in accidents. One mechanism that could change the demographics of the driving population is unemployment rate, and this factor has been shown to be a strong predictor of accident frequencies by several researchers [Cooper, 1984; Partyka, 1984]. To elaborate, overall unemployment increases first affect the younger age groups. Further, alcohol-related traffic accidents tend to be more severe than other traffic accidents and occur relatively frequently among younger drivers [Mercer, 1985]. Assuming that less disposable income in a group would produce less out-of-residence alcohol consumption and less driving, and considering that young drivers tend to be in proportionally more traffic accidents than are older drivers (e.g., [Mayhew, 1982]), then it follows that increases in unemployment would change the demographics of the driving population by reducing both the proportion of young drivers and the proportion of drinking drivers, thus reducing overall accident frequency and severity.

Similarly, changes in driver demographics could affect restraint device use frequencies and produce a falsely high correlation between increases in the percentage of restraint device use and decreases in traffic accident frequency and severity. For example, as young drivers, male drivers, and drinking drivers tend not to wear seat belts [Mercer, 1982], if increases in unemployment levels reduced any of these groups, then the proportion of drivers wearing restraint devices would increase. Further, as young male drinking drivers have a high frequency of severe traffic accidents, [Mercer, 1985], then decreases in that portion of the driving population would be expressed in a positive (and misleading) correlation between increases in restraint device use and decreases in accident frequency and severity.

It is the purpose of this paper to attempt to assess the relative contribution of changes in: unemployment rates, driver age and gender, restraint device use, and alcohol-related traffic accidents on both the average monthly severity of traffic accidents and to the average monthly frequency of casualty traffic accidents per driven kilometer.

## METHOD

Using "month" as the unit of analysis, Zero-order (Pearson's $r$) and Partial Correlation coefficients were used to assess the relationships among the following variables for the period from January 1978 to December 1984 inclusive (84 months data). In order to both assess in-vehicle safety per driven kilometer and to maximize any effects of restraint device use, only traffic accidents that involved one or more passenger vehicles (as opposed to commercial vehicle only accidents) and that did *not* involve pedestrians, motorcycles or bicycles were used in these analyses.

### *Predictor variables*

1. *Monthly Average Unemployment Figures*: Four measures of monthly, average figures for British Columbia were taken from the Statistics Canada CANSIM data base: the percentage of males unemployed who were between 15–24; the percentage of males unemployed who were over 24 years of age; the percentage of females unemployed who were between 15–24; and the percentage of females who were unemployed over 24 years of age.

2. *Monthly Average Percentage of Passenger Vehicle Casualty Accidents that were Alcohol-Related*: The average percentage of alcohol-related casualty accidents reported in the month, as recorded on the Traffic Accident Report Form (MV104) by the attending police officers were determined. The reason that only casualty accident data was used is that property damage-only accidents are self-reported by the persons involved, do not require a police investigation, and therefore are of questionable validity. On the other hand, accidents resulting in casualties must be investigated by the police. It should be noted that the determination of alcohol-involvement is done by trained investigating traffic police officers using provincially homogeneous forms and techniques, and that the same forms and police training techniques have been in place since 1977. For the purposes of this paper, a casualty accident was classified as "alcohol involved" if, in the opinion of the investigating officers, alcohol was the single primary cause of the accident. Because the absolute number of alcohol-related accidents will vary from month to month as the total number of accidents varies, and because this absolute number can also be influenced by such factors as the weather, economy and so on, the percentage of alcohol-related casualty accidents can be seen as a superior and more stable measure of the relative prevalence of drinking-driving casualty accidents over the simple number of alcohol-related casualty accidents. In turn, monthly changes in the frequencies of these accidents probably reflects changes in actual drinking-driving rates.

3. *Monthly Average Monthly Percentage of Occupants in Passenger Vehicle Casualty Accidents who were using Restraint Devices*: This variable was determined from the MV104 reports noted in (1) above. These figures have been found to be reliable estimates of actual observed restraint device use frequencies in the passenger vehicles, although these casualty accident figures tend to reliably produce figures at 12–15% above the actual observed rates [Cooper, 1985].

4. *Monthly Average Age of Drivers in Passenger Vehicle Casualty Accidents*: From the MV104 reports on passenger vehicle casualty accidents, the monthly average age of drivers in these accidents was determined. This variable was used as a reasonable in-

dicator of *changes* in the average age of the passenger vehicle driving population as a whole, (although they may not be a valid absolute measure of the average age of driving population.)

5. *Monthly Average Percentage of Males as Drivers in Passenger Vehicle Casualty Accidents*: Again, from the MV104, the percentage of males as drivers in passenger vehicle casualty accidents was used as an indication of changes in the gender composition of the passenger vehicle driving population as a whole.

*Criterion variables*:

1. *Monthly Average Casualty Accident Severity*: Monthly average casualty accident severity was measured using the proportion (taken as a percentage) of passenger vehicle fatal injuries to all passenger vehicle injuries. The rationale here is that as overall accident severity decreases, the percentage of fatal injuries ought to reflect this by also decreasing. (Total number of accidents analyzed = 126,967.)

2. *Monthly Average Number of Casualties per Million Driver Kilometers*: The monthly average number of casualties in passenger vehicle accidents for the province was taken from the MV104 reports. The number of kilometers driven by passenger vehicles was calculated by first determining the monthly number of litres of clear gasoline (i.e., not "blue" gasoline sold to commercial carriers, for farm machinery, etc.) sold per month in British Columbia from the B.C. Ministry of Finance. This figure was then multiplied by the fuel efficiency of the B.C. passenger vehicle fleet, as determined by quarterly studies on passenger car fuel consumption [Statistics Canada, quarterly publication]. It should be noted that, because figures were not available for 1978, the quarterly fuel efficiency estimates for that period were calculated by projecting the 1984–1979 figures. Finally, the monthly figures for passenger vehicle casualties were divided by the monthly figures for kilometers driven by the passenger vehicle fleet. (Total number of casualties analyzed = 214,708.)

*Analyses*

In addition to the above variables, a linear variable "time" was created by assigning January 1978 a value of 1 and increasing the value of each succeeding month by 1 to December 1984, which had the value 84. This was done in order to be used to measure for simple linear changes in these variables from 1978 to 1984.

Pearson's correlation coefficients were calculated for each of the relationships among the predictor variables, criterion variables, and "time". In addition, partial correlation matrices were calculated to control for the effects of the unemployment variables and for the effects of the unemployment variables and driver demographics variables (i.e., drivers' age and percent male drivers combined.)

## RESULTS AND DISCUSSION

*Zero-order correlations*

The simple, zero-order correlations above the diagonal in Table 1 illustrate the complexity of the relationships under consideration. For example, restraint device use significantly predicted reductions in accident severity, but restraint device use and accident severity are both significantly predicted by time, by all four measures of unemployment, by driver age, and by the percentage of alcohol-related accidents. Similarly, while increases in alcohol-related accidents significantly predicted increases in accident severity, both show significant decreases over time, with increases in unemployment, decreases with increases in average driver age and so on.

However, perhaps the notion of a "loose causal relationship" [Blalock, 1961] can add order to these data. Arguably, the variables can be catagorized into four groups, with each preceding group in part causing the changes in the following group. The first group is the unemployment variables, the second is the driver demographics variables (i.e., drivers' age, percentage of male drivers), the third group is the in-vehicle driver-attitude related variables (i.e., percentage of alcohol-related, percentage restraint device

| Variables | TIME | UMA15-24 | UMA25 | UFE15-24 | UFE25 | DAGE | $MA | $RES | $ALC | NCAS | $FAT |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Time | | .71<br>P=.00 | .81<br>P=.00 | .66<br>P=.00 | .67<br>P=.00 | .67<br>P=.00 | -.51<br>P=.00 | .71<br>P=.00 | -.45<br>P=.00 | -.58<br>P=.00 | -.26<br>P=.01 |
| Unemployed Males 15-24 (UMA1524) | | | .94<br>P=.00 | .90<br>P=.00 | .86<br>P=.00 | .74<br>P=.00 | -.50<br>P=.00 | .76<br>P=.00 | .29<br>P=.00 | -.67<br>P=.00 | -.28<br>P=.00 |
| Unemployed Males 25+ (UMA25) | | | | .90<br>P=.00 | .90<br>P=.00 | .82<br>P=.00 | -.56<br>P=.00 | .87<br>P=.00 | -.41<br>P=.00 | -.67<br>P=.00 | -.31<br>P=.00 |
| Unemployed Females 15-24 (UFE1524) | | | | | .85<br>P=.00 | .67<br>P=.00 | -.51<br>P=.00 | .73<br>P=.00 | -.23<br>P=.02 | -.67<br>P=.00 | -.17<br>P=.06 |
| Unemployed Females 25+ (UFE25) | | | | | | .74<br>P=.00 | -.50<br>P=.00 | .83<br>P=.00 | -.40<br>P=.00 | -.64<br>P=.00 | -.29<br>P=.00 |
| Driver Age (DAGE) | | | | | | | -.60<br>P=.00 | .81<br>P=.00 | -.65<br>P=.00 | -.46<br>P=.00 | -.31<br>P=.00 |
| $ Male Drivers ($MA) | | | | | | | | -.54<br>P=.00 | .49<br>P=.00 | .40<br>P=.00 | .21<br>P=.03 |
| $ Restrained ($RES) | | | | | | *1<br>.32<br>P=.00 | -.13<br>P=n.s. | | -.49<br>P=.00 | -.60<br>P=.00 | -.32<br>P=.00 |
| $ Alcohol-Related ($ALC) | | | | | | -.57<br>P=.00 | .37<br>P=.00 | | | | |
| # Casualties per MKm. (NCAS) | | *3<br>-.41<br>P=.00 | -.40<br>P=.00 | -.37<br>P=.00 | -.32<br>P=.00 | .19<br>P=.05 | .04<br>P=n.s. | -.15<br>P=n.s. | *2<br>-.10<br>P=n.s. | | |
| $ Fatal ($FAT) | | -.18<br>P=n.s. | -.13<br>P=n.s. | .00<br>P=n.s. | -.07<br>P=n.s. | -.04<br>P=n.s. | .06<br>P=n.s. | -.05<br>P=n.s. | .28<br>P=.01 | | |

*1 - Partial Correlations controlling for Unemployment
*2 - Partial Correlations controlling for Unemployment, Drivers' Age, $ Male
*3 - Partial Correlations controlling for Drivers' Age, $ Male, $ Restrained, $ Alcohol
n.s. - not significant

Table 1. Zero order correlations (above diagonal)

use) and the final group is the criterion variables of casualties per driven million kilometers and accident severity (i.e., percent fatal injuries). That is, it can be argued that changes in employment levels could change the make-up of the driver population, but it could not easily be argued that changes in the driver population could cause changes in employment levels. Similarly, changes in driver demographics could cause changes in drinking driving and in restraint device use, while the opposite would be unlikely. Finally, changes in drinking driving and restraint device use could produce changes in accident frequency and severity, but these variables are unlikely to affect changes in driver demographics or in employment levels.

Following the above framework, from the upper diagonal of Table 1 it can be seen that as levels of unemployment increased, the average age of drivers in casualty accidents also increased, and as levels of unemployment increased, the percentage of males as drivers in casualty accidents decreased. One reasonable conjecture is that unemployment increases removed young male drivers from the driving population, thus increasing the average driver age and decreasing the percentage of male drivers. Further, it can be seen that changes in the measure of both drivers' age and drivers' gender related significantly to changes in the restraint device use variable and the drinking-driving variable, which in turn related to changes in both criterion variables. Finally, it should be noted that both the measure of accident severity and accident frequency decreased over "time".

The lower diagonal of Table 1 contains partial correlations removing the effects of changes in unemployment on the relationships between: driver age and both percentage of restraint device use and the percentage of alcohol-related casualty accidents; and between percent male drivers and both percentage of restraint device use and the percentage of alcohol-related casualty accidents. From these it can be seen that, as average driver age in casualty accidents increased, the percentage of alcohol-related casualty accidents decreased and the percentage of occupants in casualty accidents who were wearing restraint devices in casualty accidents increased. Also, it can be seen that, as the percentage of males as drivers in casualty accidents increased, the percentage of occupants in these accidents who were wearing restraint devices was not affected, while as the percentage of male drivers increased, the percentage of alcohol-related casualty accidents also increased. Thus, changes in the variables associated with drivers' age and drivers' gender had effects on variables associated with drinking driving and with restraint device use that were unique and could not simply be attributed to changes in unemployment levels.

The lower diagonal of Table 1 also illustrates the partial correlations controlling for unemployment, drivers' age, and percent of male drivers for the relationships between: percent restraint device use and both accident severity (i.e., % fatal injuries) and the number of casualties per million driven kilometers; and between the percentage of alcohol-related casualty accidents and these two criterion variables. It can be seen that, after removing the effects of the unemployment and driver demographic variables, there was no statistically significant relationship between changes in restraint device use and either the measure of accident severity or the measure of accident frequency. It can also be seen that, after removing the effects of unemployment, drivers' age, and drivers' gender, there was a statistically significant relationship between changes in alcohol-related casualty accidents and changes in the percentage of fatal casualties, but there was not a statistically significant relationship between changes in the percentage of alcohol-related casualty accidents and the measure of accident frequency.

Finally, again from the lower diagonal of Table 1, it can be seen that, controlling for the effects of drivers' age, drivers' gender, alcohol-related accidents, and restraint device use, increases in all four unemployment measures significantly predicted decreases in accident frequency by distance driven, but failed to significantly predict changes in the measure of accident severity.

## CONCLUSIONS

The results of this study of monthly casualty accident data between January 1978 and December 1984 in British Columbia suggest the following:

1. Both the severity of traffic accidents, as measured by the percentage of fatal injuries, and the frequency of casualty accidents per million driven kilometers have been decreasing over the time period in question.

2. Some portion of this change can be attributed to increases in unemployment, which appear to remove young male drivers from the driving population. This in turn arguably decreases the number of drinking drivers and increases the proportion of restraint device use in the driving population, which in turn both produce decreases in accident frequency and severity.

3. Changes in employment levels produce stronger effects on accident frequency than on accident severity.

4. Over the time period in question, restraint device use in British Columbia increased. However, the relationship between this increase and decreases in either the severity of passenger vehicle casualty traffic accidents or the frequency of these accidents per million driven kilometers can be explained by increases in the unemployment variables in conjunction with changes in the driver demographic variables of driver age and driver gender.

5. Over the time period in question, the percentage of alcohol-related casualty traffic accidents in British Columbia decreased. However, the relationship between this decrease and decreases in the frequency of passenger vehicle casualty traffic accidents per million driven kilometers can be explained by increases in the unemployment variables in conjunction with changes in the driver demographic variables of driver age and driver gender. On the other hand, controlling for the effects of changes in the unemployment and driver demographic variables, there was a statistically significant relationship between these decreases and decreases in the severity of passenger vehicle casualty traffic accidents as measured by the percentage of fatal injuries.

In conclusion, changes in unemployment levels arguably produce changes in driver demographics, which then appear to be related more strongly to changes in accident frequency and severity than are changes in drinking driving and restraint device use. However, it must be emphasized that these results are based on very rough measures (i.e., monthly averages). Further, the majority of the variance in the accident frequency and severity variables has not been explained. Nonetheless, this study clearly shows that changes in traffic accident figures *must* be considered within the context of economic trends and driver demographics *in addition* to driver-related behaviour such as restraint device use and drinking driving.

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# SECTION 3

## TRAFFIC ACCIDENT TYPES

Toward an Empirically-Derived Classification of
Casualty Traffic Accident Patterns.

Motorcycle Casualty Traffic Accidents: Trends, Characteristics,
Persons Involved and Consequences. British Columbia, 1986.

Bicycle/Motor Vehicle Casualty Traffic Accidents: Trends,
Characteristics, Persons Involved and Consequences.
British Columbia, 1986.

Pedestrian/Motor Vehicle Casualty Traffic Accidents: Trends,
Characteristics, Persons Involved and Consequences.
British Columbia, 1986.

# Toward an Empirically-Derived Classification of Casualty Traffic Accident Patterns.

## SUMMARY

It is the purpose of this paper to examine the epidemiology of police-investigated casualty traffic accidents in order to see if they can be empirically grouped into a limited number of mathematically-defined patterns so that policy makers and educators can direct their efforts to develop countermeasures based on an assessment of what actually exists, as opposed to what happens to be topical.

A factor-analytic examination of 29 variables across 19,121 casualty-producing traffic accidents produced a 10-factor solution accounting for 56% of the variance. These factors reflect 10 separate accident patterns.

The following order of interpretation of the factors does not parallel their numeric order, but rather tries to interpret the factors in an associative order.

Factor 6 reflects a pattern of following-too-closely and/or driving-without-due-care multiple vehicle accidents producing somewhat severe damage.

Factor 1, like Factor 6 also involves following-too-closely and/or driving-without-due-care, but in addition includes failure-to-yield-right-of-way. It has a low-speed, low-damage intersection accident configuration involving a rear-end (following-too-close) or pedestrian (failure-to-yield) collision. Arguably, the driver may have been careless and inattentive, but was not trying to "run the light".

Factor 5 also represents intersection accidents, but this configuration represents those accidents where the driver consciously ignored a stop sign or signal.

Factor 8 is the third and final intersection accident configuration. It appears to be the product of a motorcycle/ other motor vehicle conflict where one or the other driver turns improperly and/or fails to yield the right of way.

Factor 7, like Factor 8, appears to represent a motorcycle accident configuration. However, Factor 7 involves an inexperienced motorcyclist in a high-speed, single-vehicle run-off at a curve. Both of these patterns of motorcycle accidents have been identified elsewhere (Mercer, 1987).

Factor 9, like Factor 7 also involves driver inexperience, but Factor 9 reflects a traffic accident pattern of young, female drivers carrying passengers.

Unlike the young female driver pattern of Factor 9, the young male driver pattern of Factor 3 reflects driver histories involving previous non-alcohol-related traffic convictions, previous alcohol-related traffic convictions, and previous traffic accidents. As *only* driver characteristics loaded to any great extent, one might imagine that this factor involves drivers who would have traffic accidents under any circumstances.

Factor 4, like Factor 3, also involves drivers with a previous history of alcohol-related convictions. However, this factor appears to reflect an almost classic drinking-driving accident pattern: alcohol; carelessness and speed as causes; night-time occurrence; driver not wearing a restraint device; and severe damage to the vehicle.

Finally, Factors 2 and 10 appear to have very straightforward interpretations, with the former reflecting weather-related accidents and the latter bicycle accidents.

## Toward an Empirically-derived Classification of Casualty Traffic Accident Patterns

Every traffic accident is unique. However, for policy makers and educators to construct legislation and programs to reduce accidents, they need to know whether or not there are patterns that accidents can be grouped into so that countermeasures can be developed to address these common accidents.

Traffic accident analysis theory often classifies accidents in terms of dimensions such as "human factors", "environmental factors" and "vehicular factors", and these broad categories can be further examined in terms of pre-crash, crash and post-crash. For example, the Traffic Injury Research Foundation (Haas, Walsh, and Donelson, 1985) has developed a "Causal Factor Schema" which allows the classification of accidents in terms of six general categories, each with at least four sub-categories, while each sub-category has a number of sub-categories. While this sort of theoretical, logically complete schemata for accident cause classification allows a very thorough description of each traffic accident, it also results in literally thousands of unique accident descriptions. Clearly, a purely theoretical approach to the question of accident type classification can not yield a solution for countermeasure developers.

On the other hand, the published research literature can not be relied upon to reflect a completely accurate picture of the patterns and extent of types of traffic accidents that exist. For example, from Table 1 it can be seen that a content analysis

Table 1
Content Analysis of Traffic Accident Research Abstracts

| Content Area | N | % |
|---|---|---|
| CAUSES | | |
| Alcohol | 63 | 30.3% |
| W/out due care | 4 | 1.9% |
| Speed | 16 | 7.7% |
| Fail to yield | 1 | 0.5% |
| Ignore traffic control device | 5 | 2.4% |
| Improper turn | 1 | 0.5% |
| Following too closely | 0 | 0.0% |
| Inexperience | 12 | 5.8% |
| Weather | 2 | 1.0% |
| ENVIRONMENTAL | | |
| Density (urban/rural) | 22 | 10.6% |
| Road curve | 7 | 3.4% |
| Intersection | 17 | 8.2% |
| Traffic control device | 9 | 4.3% |
| Speed zone | 4 | 1.9% |
| Road surface | 7 | 3.4% |
| Weather | 12 | 5.8% |
| Darkness | 20 | 9.6% |
| DRIVER | | |
| Sex | 22 | 10.6% |
| Age | 57 | 27.4% |
| Restraint device use | 23 | 11.1% |
| # Passengers | 9 | 4.3% |
| Reckless driving record | 5 | 2.4% |
| Impaired driving record | 5 | 2.4% |
| # previous accidents in record | 11 | 5.3% |
| PARTICIPANTS | | |
| # Vehicles | 17 | 8.1% |
| Pedestrian accidents | 28 | 13.5% |
| Bicycle accidents | 19 | 9.1% |
| Motorcycle accidents | 25 | 12.0% |
| DAMAGE SEVERITY | 6 | 2.9% |

of 208 research abstracts on traffic accidents published in Highway Safety Literature (1986) showed that topics such as alcohol (30%) and driver age (27%) were very well represented but that others such as following-too-closely (0%) and failure-to-yield-right-of-way (0.5%) were virtually nonexistent. Of course, one would not necessarily expect the quantity of research published of a topic to have a 1-to-1 relationship with the frequency of that accident cause or dimension, but arguably some areas are not being addressed. In any case, it would appear that an examination of research epidemiology can not be relied on to result in an accident type and frequency classification system that could be used to develop a relatively limited but complete set of countermeasure programs.

Consequently, it is the purpose of this paper to examine the epidemiology of police-investigated casualty traffic accidents in order to see if they can be empirically grouped into a limited number of mathematically-defined patterns so that policy makers and educators can direct their efforts to develop countermeasures based on an assessment of what actually exists, as opposed to what happens to be topical.

## METHOD

### DATA SOURCE:

The data for this study were drawn from 19,121 police traffic accident investigation forms representing the entire set of casualty traffic accidents for B.C. drivers in 1984, and from driver traffic violation charge and previous accident records for those involved. Both of these data sources were supplied in computer-readable format by the Motor Vehicle Department of the Ministry of Transportation and Highways of British Columbia. The reason that only injury and/or death-producing (i.e. casualty) accidents were used is that property-damage-only traffic accidents in B.C. are self-reported and therefore are of questionable reliability and validity, while casualty traffic accidents are investigated by trained police officers using forms and techniques that are homogenous throughout the province.

### VARIABLES:

The variables drawn from the above sources can be grouped into measures of accident causes, accident environments, driver characteristics, crash participant characteristics, and crash severity.

### Accident Causes:

Upon investigation of traffic accidents, the police can assign up to three causal factors to each driver in each vehicle in the accident. For the purpose of this paper, the 9 most frequently cited causes for casualty-producing traffic accidents were included in the analyses. In descending order they are: driving without due care and attention (28.8%), failure to yield right of way (18.3%), excessive speed (15.2%), alcohol involvement (14.7%), weather related (10.7%), following too closely (8.2%), ignoring traffic control device (6.2%), driver inexperience (5.0%) and improper turning (3.0%). It must be emphasized that these represent police judgement as to cause, not simply presence, of a contributing factor.

Accident Environment:

Eight measures of accident environment were included in these analyses. Each was chosen on the basis that it both had been found to be a predictor of casualty traffic accidents in the literature and it was not completely redundant to other variables in the set. For example, while the road surface will always be wet during rain, the surface can be wet when it is not raining, and therefore both measures were included. They are listed from the most macroscopic and permanent accident environment features to the most microscopic and environmentally transitory accident features.

Land use in the general area of the accident was included because it can reflect both population and traffic density. The codes used were: 1 = undeveloped or agricultural area, 33.4%; 2 = family/residential or suburban, 32.8%; and 3 = central business district or high-density apartments, 33.8%. The variable was labelled "population density".

Two measures of the road configuration at the accident site were chosen: whether or not the accident was on a curve in the road (23.4% at curve) and whether or not the accident occurred at the intersections of two roads (53.0% at intersection).

Two measures of the traffic law-related status of the accident environment were chosen: whether or not there was a traffic control device in place such as a stop light, stop sign or yield sign (34.3% had such a device) and whether or not the posted speed limit was above 50 kilometers per hour (46.9% above 50 Kmh).

Three measures of the ambient environment at the accident site were chosen. The first was road surface condition and was ordered from most to least traction: 1 = dry, 58.3%; 2 = wet, 31.3%; and 3 = snow or ice, 10.4%. The second was a measure of weather arranged in order of increasing driving impairment: 1 = clear or cloudy, 75.6%; 2 = rain, 19.6%; and 3 = snow/hail/fog, 4.6%. Finally, illumination was coded from high to low: 1 = daylight or bright artificial light, 68.6%; 2 = some artificial light or dawn or dusk, 20.3%; and 3 = darkness, 11.1%.

Driver Characteristics:

Due to the difficulties in developing measures that would encompass characteristics of all of the drivers in each casualty accident, only characteristics of the police-identified #1 driver (generally the driver at fault) were assessed. Seven driver-related characteristics were examined: driver age (mean= 33.7 years, standard deviation= 15.4 years); driver gender (70.7% male); whether or not the driver wore a restraint device (89.5% restrained or the vehicle was not equipped with a restraint device - e.g. motorcycle); the number of passengers in the vehicle excluding the driver (mean= .56, standard deviation= .93); the driver's score on a "reckless driving" factor (mean= 1.5, standard deviation= .29); the driver's score on an "impaired driving" factor (mean= 1.5, standard deviation= .33); and the total number of traffic accidents recorded for the driver for the previous 55 months (mean= 1.6, standard deviation= 1.0). Further explanation on the restraint device use figures and the reckless driving and impaired driving factors follow.

Regarding the high reported restraint device use figure, the actual restraint device use was probably somewhat lower for two reasons. First, in order that these analyses could include motorcycle accidents, a driver was coded as obeying the restraint device legislation if she/he was noted as being restrained by the investigating police officer or if the vehicle was not equipped with a restraint device. Second, as a driver is open to prosecution for not wearing a restraint device, there is a degree of misrepresentation by drivers on this matter. [Cooper (1985) found that the police-reported casualty accident restraint device use figures reliably over-represent actual use figures in the population by about 12% to 15% of the reported proportion.]

The "reckless driving" and "impaired driving" factor scores were derived from a factor analysis of drivers' traffic convictions (Mercer, 1987). The former factor involved factor markers of violations for speeding, and disobeying traffic signals, while the latter factor had markers of impaired driving and speeding convictions. The factor scores for these drivers were calculated on their previous convictions using a complete estimation technique.

### Crash Participant Characteristics:

These four variables are measures of characteristics of the participants or entities involved in the casualty traffic accident. They are: total number of vehicles involved (mean= 1.8, standard deviation= .69); whether or not a pedestrian was involved (6.5%); whether or not a bicycle was involved (5.1%; and whether or not a motorcycle was involved (8.2%).

### Crash Severity:

The last variable included in these analyses was a measure of the severity of the damage done to the vehicle of driver #1. The codes were: 1 = no damage, 8.1%; 2 = light damage, 23.7%; 3 = moderate damage, 30.0%; 4 = severe damage, 23.4%; and 5 = demolished, 14.8%.

### ANALYSES:

In order to determine whether or not the above casualty traffic accident variables form a set of patterns that can be identified as specific accident configurations or descriptions (i.e. factors), the statistical technique of factor analysis was used. This technique examines the relationships among all of the variables and establishes the existence and number of broad patterns among the variables. Numeric values are then assigned to each variable for each "factor" or pattern, such that the higher the absolute value of the variable, the more substantial the contribution of that variable to the factor (see, for example, Rummel, 1970).

These twenty-nine variables reduced to 10 factors each with an eigenvalue of 1.0 or greater and accounted for 56% of the variance before varimax rotation.

## RESULTS AND DISCUSSION

### Factor Interpretations:

Table 2 shows the rotated factor matrix for the 29 variables and Table 3 gives a simplified variable-label description of the factor markers in the analyses. The following order of interpretation of the factors does not parallel their numeric order on these tables, but rather tries to interpret the factors in an associative order.

Factor 6 reflects a pattern of following-too-closely and/or driving-without-due-care multiple vehicle accidents producing somewhat severe damage.

Factor 1, like Factor 6 also involves following-too-closely and/or driving-without-due-care, but in addition includes failure-to-yield-right-of-way. It has a low-speed, low-damage intersection accident configuration involving a rear-end (following-too-close) or pedestrian (failure-to-yield) collision. Arguably, the driver may have been careless and inattentive, but was not trying to "run the light".

Factor 5 also represents intersection accidents, but this configuration represents those accidents where the driver consciously ignored a stop sign or signal.

Factor 8 is the third and final intersection accident configuration. It appears to be the product of a motorcycle/ other motor vehicle conflict where one or the other driver turns improperly and/or fails to yield the right of way.

Table 2
Rotated Factor Matrix

| VARIABLES | FACTOR 1 | FACTOR 2 | FACTOR 3 | FACTOR 4 | FACTOR 5 | FACTOR 6 | FACTOR 7 | FACTOR 8 | FACTOR 9 | FACTOR 10 | VARIABLES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| CAUSES | | | | | | | | | | | CAUSES |
| Alcohol | -.026 | -.086 | .140 | .705 | -.068 | -.117 | .054 | -.006 | -.046 | -.102 | Alcohol |
| Due Care | .198 | -.134 | .019 | .442 | -.073 | .235 | .169 | -.249 | .027 | -.028 | Due Care |
| Speeding | -.071 | .181 | .058 | .260 | -.008 | .051 | .577 | -.115 | .044 | .004 | Speeding |
| Not Yield | .194 | -.068 | -.072 | -.138 | .296 | -.038 | -.064 | .606 | -.057 | .028 | Not Yield |
| Ignore Traffic control | -.008 | -.064 | .046 | -.024 | .731 | .040 | -.015 | -.159 | .007 | .029 | Ignore Traffic control |
| Improper Turn | .096 | -.030 | .008 | .044 | -.264 | .184 | -.069 | .620 | .039 | -.007 | Improper Turn |
| Follow too Close | .225 | -.061 | .001 | -.199 | -.251 | .357 | -.261 | -.440 | -.023 | -.279 | Follow too Close |
| Inexperience | .022 | -.020 | -.145 | -.200 | -.068 | -.016 | .415 | -.028 | .491 | .086 | Inexperience |
| Weather | -.109 | .725 | -.009 | -.116 | -.067 | -.059 | .096 | -.029 | .024 | .012 | Weather |
| ENVIRONMENT | | | | | | | | | | | ENVIRONMENT |
| Density | .744 | -.062 | -.008 | -.038 | .127 | .017 | -.012 | .058 | -.031 | .021 | Density |
| Road Curve | -.458 | .091 | .005 | .120 | -.098 | -.060 | .454 | -.141 | -.015 | .016 | Road Curve |
| Intersection | .447 | -.066 | -.012 | -.133 | .536 | .108 | -.104 | .278 | -.062 | .050 | Intersection |
| Traffic Ctrl | .285 | -.025 | -.021 | -.068 | .719 | .058 | -.074 | .145 | -.041 | -.065 | Traffic Ctrl |
| Speed Zone | -.704 | .014 | .010 | -.061 | -.131 | .012 | -.135 | -.067 | -.004 | -.052 | Speed Zone |
| Road Surface | -.084 | .852 | -.036 | -.009 | -.038 | -.005 | .024 | -.032 | .011 | -.040 | Road Surface |
| Weather | .045 | .799 | .008 | -.004 | -.010 | .032 | -.024 | .003 | -.010 | -.056 | Weather |
| Darkness | -.294 | .166 | .090 | .373 | -.122 | -.234 | -.034 | .028 | .171 | -.099 | Darkness |
| DRIVER #1 | | | | | | | | | | | DRIVER #1 |
| Sex | -.086 | -.018 | .509 | .076 | -.062 | -.008 | .101 | .084 | -.256 | .091 | Sex |
| Age | -.085 | .031 | -.301 | -.069 | .113 | .053 | -.164 | .043 | -.648 | -.098 | Age |
| Restraint Device | .073 | .034 | -.007 | -.549 | .018 | .006 | .005 | -.027 | -.022 | .058 | Restraint Device |
| # Passengers | -.189 | .056 | -.064 | .105 | .059 | .039 | -.186 | .043 | .611 | .027 | # Passengers |
| Reckless Factor | .061 | -.002 | .799 | .023 | .094 | .029 | .021 | -.062 | .128 | .015 | Reckless Factor |
| Impaired Factor | .005 | -.031 | .660 | .404 | -.047 | -.017 | .068 | -.060 | .067 | -.014 | Impaired Factor |
| # Accidents | -.035 | .001 | .711 | -.074 | .013 | -.009 | -.071 | -.013 | .049 | .050 | # Accidents |
| PARTICIPANTS | | | | | | | | | | | PARTICIPANTS |
| Total # veh. | .312 | -.009 | -.015 | -.178 | .130 | .645 | -.213 | .063 | -.081 | -.032 | Total # veh. |
| Pedestrian | .280 | .000 | -.017 | -.067 | -.053 | -.786 | -.176 | -.067 | -.056 | -.099 | Pedestrian |
| Bicycle | .125 | -.093 | .000 | -.064 | -.045 | .055 | -.029 | .051 | -.054 | .901 | Bicycle |
| Motorcycle | .087 | -.264 | .154 | -.318 | -.140 | -.015 | .528 | .233 | -.103 | -.241 | Motorcycle |
| DAMAGE SEVERITY | -.511 | .061 | .029 | .374 | .146 | .273 | .165 | .079 | .150 | -.268 | DAMAGE SEVERITY |

Table 3
Description of Factors in Order of Interpretation

| | Factor 6 | Factor 1 | Factor 5 | Factor 8 | Factor 7 | Factor 9 | Factor 3 | Factor 4 | Factor 2 | Factor 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CAUSES | **follow too closely**<br>without due care | driving without due care<br>following too closely<br>fail to yield | **IGNORE TRAFFIC CONTROL**<br>**fail to yield**<br>not following too closely<br>not improper turn | **FAIL TO YIELD**<br>**IMPROPER TURN**<br>NOT FOLLOWING TOO CLOSELY<br>not driving without due care | **SPEEDING**<br>INEXPERIENCE<br>not following too closely | INEXPERIENCE | | **ALCOHOL**<br>DRIVING WITHOUT DUE CARE<br>not following too closely<br>not inexperience<br>speeding | **WEATHER** | not following too closely |
| ENVIRONMENT | not dark | **HIGH DENSITY**<br>**NOT OVER 50 KMH**<br>AT INTERSECTION<br>NO CURVE<br>not darkness<br>traffic ctrl | **TRAFFIC CTRL**<br>**AT INTERSECTN** | at intersectn | AT CURVE | | | **dark** | **ROAD SURFACE**<br>**WEATHER** | |
| DRIVER | | | | | | **YOUNG**<br>**WITH PASSENGERS**<br>female | **MALE**<br>**young**<br>**RECKLESS DRIVING HISTORY**<br>**DRINKING DRIVING HISTORY**<br>**TRAFFIC ACCIDENT HISTORY** | **NOT WEARING RESTRAINT**<br>DRINKING DRIVING HISTORY | | |
| PARTICIPANTS | **MULTIPLE VEH.**<br>**NOT PEDESTRIAN** | **multiple veh.**<br>pedestrian | | motorcycle | **MOTORCYCLE**<br>not multiple vehicle | | | **not motorcycle** | not motor-cycle | **BICYCLE**<br>not motor-cycle |
| DAMAGE SEVERITY | severe damage | **NOT SEVERE DAMAGE** | | | | | | **severe damage** | | not severe damage |

LEGEND: Factor Loading .20 - .29 small print
.30 - .39 **small print, double strike**
.40 - .49 CAPITALS
.50+ **CAPITALS, DOUBLE STRIKE**

Factor 7, like Factor 8, appears to represent a motorcycle accident configuration. However, Factor 7 involves an inexperienced motorcyclist in a high-speed, single-vehicle run-off at a curve. Both of these patterns of motorcycle accidents have been identified elsewhere (Mercer, 1987).

Factor 9, like Factor 7 also involves driver inexperience, but Factor 9 reflects a traffic accident pattern of young, female drivers carrying passengers.

Unlike the young female driver pattern of Factor 9, the young male driver pattern of Factor 3 reflects driver histories involving previous non-alcohol-related traffic convictions, previous alcohol-related traffic convictions, and previous traffic accidents. As only driver characteristics loaded to any great extent, one might imagine that this factor involves drivers who would have traffic accidents under any environmental or causal circumstances.

Factor 4, like Factor 3, also involves drivers with a previous history of alcohol-related convictions. However, this factor appears to reflect an almost classic drinking-driving accident pattern: alcohol; carelessness and speed as causes; night-time occurrence; driver not wearing a restraint device; and severe damage to the vehicle.

Finally, Factors 2 and 10 appear to have very straightforward interpretations, with the former reflecting weather-related accidents and the latter bicycle accidents.

## Conclusions:

To return to the starting point of this paper, every traffic accident is unique. However, these analyses show that broad patterns can be defined through a statistical (as opposed to theoretical) examination of measures of causes, environments, drivers, participants and damage severity. Certainly some of the patterns identified are incomplete and with further research could be broken down into sub-patterns. For example, bicycle accidents have been broken out into a number of more detailed configurations (Mercer, 1987). Nonetheless, even though only 56% of the variance was accounted for in the factor analysis, the patterns that emerged can help to identify directions for future research and countermeasure programs.

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# Motorcycle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

# SUMMARY

Motorcycle accidents comprised about 8% of the total number of casualty traffic accidents in British Columbia between 1980 and 1986, and followed a seasonal cycle, peaking in the July-August period. In 1986, about 30% of these were single-vehicle accidents and the remainder involved a motorcycle and another motor vehicle.

Single-vehicle motorcycle casualty accidents tended to occur in the afternoon and evening periods, toward the end of the week, and in rural areas at a curve in the road. Typically, the motorcycle ran off the road to the right and the accident was caused by driving without due care (17%), alcohol (17%), speeding (15%), or inexperience (11%). The average age of the motorcycle rider was about 27 years, 95% were male, and 20% carried passengers.

On the other hand, multiple-vehicle motorcycle casualty accidents typically occurred in the afternoon and early evening, toward the end of the week, in business and residential areas, and at an intersection. Typically, the motorcycle was struck by a driver of another vehicle who was turning left and failed to yield the right of way. Similar to single-vehicle motorcycle accidents, the motorcyclists in these accidents averaged about 27 years of age, and about 95% were male. However, only about 14% carried passengers.

In terms of accident countermeasures, for single-vehicle motorcycle accidents, the role of inexperience might prove to be a useful focus, while motorcycle conspicuity and programs aimed at making other drivers aware of motorcycles could be a profitable direction in reducing multiple-vehicle motorcycle accidents.

# Motorcycle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved, and Consequences. British Columbia, 1986.

A motorcycle is more than an inexpensive means of transportation. There is a mystique about motorcycles and motorcyclists. The term "motorcyclist" or "biker" evokes a very different image than does the term "driver". The former generates an image of a tough, daring, and skillful individualist, while the latter is a faceless shadow strapped into a glass and steel box, isolated completely from the outside environment by a cushioned ride, air conditioning, and stereophonic music. The experience of going from one place to another on a motorcycle is an invigorating, all-absorbing and multi-sensory one, involving the rider completely. Motorcyclists often ride for pleasure, searching out curved backroads that can test both the rider and the machine. In short, motorcycling is experienced in a very positive manner by a large number of people - about 7% of the driving population in British Columbia.

Unfortunately, some of the aspects of motorcycling that make it appealing also make it dangerous: the high degree of skill necessary to operate a motorcycle safely and the exposed position of the rider both make the rider extremely vulnerable to errors on his/her part or on the part of other motorists. To illustrate, in British Columbia in 1986 about 1.3% of both motorcycle riders and other drivers had a casualty-producing traffic accident, but of those, 2.5% of those involving a motorcycle were fatal accidents while 1.7% of those involving other vehicles were fatal. Overall, in B.C. in 1986 there were over 2,000 casualty traffic accidents involving motorcycles, comprising about 7.2% of the injury-producing accidents and 10.3% of the fatal accidents. It is the purpose of this paper to examine the trends and characteristics of these accidents in order to contribute to the development of measures that might reduce these crashes.

## METHOD

In order to examine trends in motorcycle-involved casualty accidents (i.e. an accident where one or more persons were injured or killed), police Traffic Accident Reports (MV104) were examined from 1980 to 1986, while a detailed analysis of those accidents was drawn from the 1986 MV104 casualty accident reports. As the raw data from these police reports are managed by the Motor Vehicle Department of the Ministry of Transportation and Highways, and as that Department is constantly improving their data base, any statistics produced by that Department that contradict those reported herein ought to be considered as the more accurate.

## RESULTS

When examining the events and factors associated with a traffic accident, it can be useful to distinguish between single-vehicle and multiple-vehicle accidents, especially if the purpose of the analyses is to develop accident countermeasures. To elaborate, in a single-vehicle motorcycle accident the target audience for countermeasures is the motorcyclist, while in a multiple-vehicle accident involving a motorcycle, the target audience includes both motorcyclists and other motorists. It follows that, if the causes and configurations of these two sorts of accidents differ, then more than one type of public education countermeasure message should be developed, while if the causes were similar (e.g. motorcyclist inexperience), then only one target and educational message focus need be developed. Consequently, many of these analyses are examined in terms of both single-vehicle and multiple-vehicle casualty accidents.

### Trends and Patterns:

From Table 1 it can be seen that casualty traffic accidents involving motorcycles comprised about 8% of the total number of casualty accidents per year between 1980 and 1986, with no clear trend being apparent. Figures 1 and 2 show that these accidents followed a seasonal cycle, reaching a high point in the July to August period of about 12% to 18% of the monthly number of casualty traffic accidents, and low point in the November to January period of about 1% to 3%.

Table 1
Casualty Accident Frequencies: Year by Percentage Motorcycle Accidents

| YEAR | TOTAL # OF CASUALTY ACCIDENTS | % INVOLVING MOTORCYCLE |
|---|---|---|
| 1980 | 29,268 | 6.6% |
| 1981 | 31,455 | 7.6% |
| 1982 | 24,262 | 11.0% |
| 1983 | 23,089 | 9.2% |
| 1984 | 23,440 | 8.5% |
| 1985 | 25,155 | 7.5% |
| 1986 | 29,138 | 7.1% |

Figure 1.
% of Casualty Traffic Accidents Involving Motorcycles
British Columbia Jan. 1980-Dec. 1986

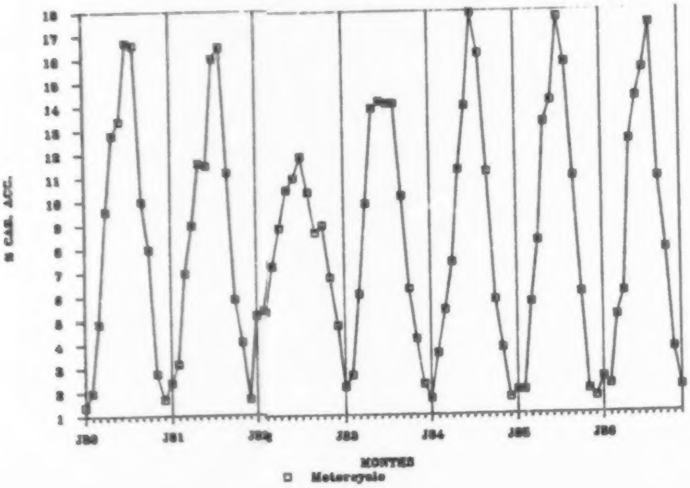
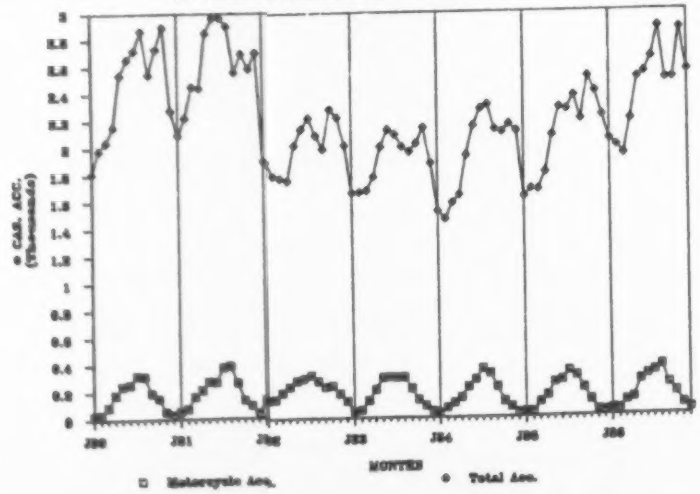


Figure 2.
# of Motorcycle-Involved and Total # of Casualty Traffic Accidents
British Columbia Jan. 1980-Dec. 1986



## CASUALTY ACCIDENT CHARACTERISTICS:

### Time, Location and Conditions:

Table 2 shows that, for both motorcycle-involved and other casualty traffic accidents, single-vehicle accidents occurred more frequently on Fridays and Saturdays than did multiple-vehicle accidents, although both accident types were most frequent during those two days. Tables 3 and 4 show that motorcycle-involved and non-motorcycle-involved single and multiple vehicle casualty accidents tended to occur in daylight (between the hours of 2 p.m. and 8 p.m.) but that single-vehicle accidents, especially non-motorcycle single-vehicle accidents, occurred less often in daylight conditions than did multiple-vehicle accidents.

Table 5 shows no clear municipal/rural division in terms of the proportion of casualty traffic accidents involving motorcycles, with some areas showing a higher proportion of these accidents in rural policing jurisdictions and some showing a higher proportion in municipal jurisdictions.

As can be seen from Table 6, there were no profound differences between motorcycle-involved and non-motorcycle-involved accidents in terms of land use in the accident area. For both, single-vehicle accidents were most frequent in rural, agricultural areas and multiple-vehicle accidents in business/shopping and family/residential areas. This is reflected in Table 7 which illustrates for both motorcycle and non-motorcycle accidents, single-vehicle crashes occurred most frequently between intersections and multiple-vehicle crashes at intersections. It follows

Table 2
Day of Week of Casualty Accidents:
Non-Motorcycle vs. Motorcycle
British Columbia, 1986.

| Casualty Accident Type | DAY OF WEEK | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| **Single Vehicle** | | | | | | | |
| Motorcycle not involved N=8,909 | 11.0% | 11.4% | 12.7% | 13.2% | 15.9% | 20.3% | 15.3% |
| Motorcycle involved N=622 | 11.4% | 9.2% | 12.9% | 12.7% | 15.3% | 20.7% | 17.8% |
| **Multiple Vehicle** | | | | | | | |
| Motorcycle not involved N=18,149 | 13.1% | 13.5% | 14.6% | 14.6% | 17.2% | 15.8% | 11.1% |
| Motorcycle involved N=1,458 | 11.8% | 14.1% | 15.8% | 12.6% | 17.4% | 16.3% | 12.0% |

Table 3
Time of day of Casualty Accidents:
Non-Motorcycle vs. Motorcycle
British Columbia, 1986.

| Casualty Accident Type | TIME OF DAY (two hour intervals) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Midnight 2:00 AM | 2:00 AM 4:00 AM | 4:00 AM 6:00 AM | 6:00 AM 8:00 AM | 8:00 AM 10:00 AM | 10:00 AM NOON | NOON 2:00PM | 2:00 PM 4:00 PM | 4:00 PM 6:00 PM | 6:00 PM 8:00 PM | 8:00 PM 10:00 PM | 10:00 PM Midnight |
| **Single Vehicle** | | | | | | | | | | | | |
| Motorcycle not involved N=8,909 | 10.1% | 8.4% | 4.6% | 6.1% | 7.3% | 7.0% | 7.2% | 10.5% | 11.4% | 10.1% | 9.0% | 8.4% |
| Motorcycle involved N=622 | 7.7% | 6.3% | 2.0% | 4.4% | 3.5% | 7.1% | 9.4% | 12.5% | 13.2% | 12.9% | 11.3% | 10.2% |
| **Multiple Vehicle** | | | | | | | | | | | | |
| Motorcycle not involved N=15,349 | 3.6% | 2.4% | 0.8% | 4.6% | 8.6% | 10.3% | 12.3% | 16.9% | 18.1% | 10.9% | 6.8% | 5.1% |
| Motorcycle involved N=1,324 | 3.6% | 1.7% | 0.2% | 4.0% | 5.3% | 7.1% | 12.3% | 15.5% | 18.0% | 14.9% | 10.5% | 6.9% |

Table 4
Light Conditions During Casualty Accidents:
Non-Motorcycle vs. Motorcycle
British Columbia, 1986.

| Casualty Accident Type | LIGHT CONDITION | | | | | |
|---|---|---|---|---|---|---|
| | Day-Light | Dawn | Dusk | Night/Full Illumination | Night/Some Illumination | Night/No Illumination |
| Single Vehicle | | | | | | |
| Motorcycle not involved N=8,826 | 46.4% | 2.7% | 3.5% | 7.3% | 16.9% | 23.3% |
| Motorcycle involved N=616 | 61.9% | 1.6% | 3.7% | 5.4% | 12.2% | 15.3% |
| Multiple Vehicle | | | | | | |
| Motorcycle not involved N=17,987 | 70.3% | 1.0% | 3.5% | 7.6% | 3.7% | 13.8% |
| Motorcycle involved N=1,451 | 71.3% | 0.6% | 5.0% | 8.6% | 2.5% | 12.1% |

Table 5
Percentage of Motorcycle Accidents by Police Subdivision
British Columbia, 1986.

| LOCATION | CASUALTY ACCIDENT TYPE | | | |
|---|---|---|---|---|
| | Single Vehicle | | Multiple vehicle | |
| | Total # Accidents | Motorcycle involved | Total # Accidents | Motorcycle involved |
| Courtenay Municipal | 151 | 7.9% | 324 | 6.8% |
| Courtenay Rural | 489 | 7.6% | 272 | 14.0% |
| Kamloops Municipal | 247 | 9.3% | 500 | 8.0% |
| Kamloops Rural | 745 | 5.5% | 249 | 9.6% |
| Kelowna Municipal | 310 | 6.5% | 750 | 9.6% |
| Kelowna Rural | 628 | 8.3% | 465 | 9.5% |
| Nelson Municipal | 40 | 5.0% | 134 | 3.7% |
| Nelson Rural | 594 | 6.2% | 245 | 9.8% |
| Prince George Municipal | 223 | 4.9% | 532 | 8.6% |
| Prince George Rural | 637 | 3.1% | 235 | 9.4% |
| Prince Rupert Municipal | 86 | 5.8% | 104 | 9.6% |
| Prince Rupert Rural | 343 | 4.1% | 96 | 6.3% |
| Victoria Municipal | 205 | 7.8% | 522 | 5.7% |
| Victoria Rural | 432 | 6.9% | 433 | 10.2% |
| R.C.M.P. Lower Mainland | | | | |
| Municipal | 1,780 | 6.9% | 6,438 | 6.6% |
| Rural | 468 | 9.4% | 380 | 9.5% |
| R.C.M.P. Freeway Patrol | 241 | 6.2% | 583 | 4.1% |
| Nelson Area Independents | 10 | 20.0% | 22 | 4.5% |
| Vancouver Area Independents | 1,485 | 5.2% | 5,992 | 7.1% |
| Victoria Area Independents | 400 | 10.0% | 1,323 | 8.8% |
| Other Police | 7 | 14.3% | 6 | 16.7% |
| British Columbia Total | 9,531 | 6.5% | 19,607 | 7.4% |

Table 6
Land Use at Casualty Accidents:
Non-motorcycle vs. Motorcycle
British Columbia 1986.

| Casualty Accident Type | LAND USE | | | | | | |
|---|---|---|---|---|---|---|---|
| | School/ Playgrnd | Family Res. | Apart- ment | Business/ Shopping | Indus- trial | Agricul- tural | Recreation Camp/Park |
| Single Vehicle | | | | | | | |
| Motorcycle not involved N=8,909 | 2.4% | 22.2% | 4.1% | 18.5% | 5.1% | 43.6% | 4.1% |
| Motorcycle involved N=622 | 2.6% | 24.6% | 4.7% | 15.9% | 6.6% | 39.4% | 6.2% |
| Multiple Vehicle | | | | | | | |
| Motorcycle not involved N=15,349 | 2.9% | 29.7% | 7.2% | 39.1% | 6.9% | 12.5% | 1.6% |
| Motorcycle involved N=1,324 | 3.5% | 29.7% | 7.9% | 40.3% | 6.2% | 9.1% | 3.4% |

Table 7
Locations of Casualty Accidents:
Non-Motorcycle vs. Motorcycle
British Columbia, 1986.

| Casualty Accident Type | ACCIDENT LOCATIONS | | | | |
|---|---|---|---|---|---|
| | Inter- section | Between intersections | "T" Junction | Bridge | Other |
| Single Vehicle | | | | | |
| Motorcycle not involved N=8,909 | 22.6% | 61.5% | 4.2% | 2.4% | 9.4% |
| Motorcycle involved N=622 | 21.9% | 62.6% | 4.4% | 2.2% | 8.9% |
| Multiple Vehicle | | | | | |
| Motorcycle not involved N=18,149 | 56.9% | 29.9% | 7.3% | 2.2% | 3.6% |
| Motorcycle involved N=1,458 | 57.0% | 26.1% | 12.3% | 0.8% | 3.8% |

that Table 8 shows that both motorcycle and non-motorcycle single-vehicle accidents occurred where there was no traffic control device, while both motorcycle-involved and non-motorycle-involved multiple vehicle accidents occurred more frequently where there was a traffic control device than did single-vehicle accidents.

Tables 9 and 10 show that both single-vehicle and multiple-vehicle motorcycle casualty accidents occurred more frequently in clear weather and on dry roads than did non-motorcycle-involved casualty accidents. Regarding the horizontal and vertical characteristics of the road (Tables 11 and 12), both motorcycle and non-motorcycle multiple-vehicle accidents occurred primarily on straight, flat sections, while both sorts of single-vehicle accidents were somewhat more frequent on curved, flat sections. Significantly, over half of the single-vehicle motorcycle accidents occurred on curved sections.

Finally, Table 13 shows that for both motorcycle and non-motorcycle accidents, single vehicle accidents occurred in areas of higher posted speed limits than did multiple-vehicle accidents.

Vehicles:

Casualty traffic accidents involving motorcycles, like those not involving motorcycles, were primarily multiple-vehicle occurrences (motorcycle involved, 30% single vehicle; non-motorcycle-involved, 33% single vehicle). Similarly, the proportion of hit-and-run casualty accidents involving motorcycles (4.1%) was approximately that of those sorts of accidents not involving

Table 8
Traffic Control Device at Casualty Accidents:
Non-Motorcycle *vs.* Motorcycle
British Columbia, 1986.

| Casualty Accident Type | TYPE OF TRAFFIC CONTROL | | | | | | |
|---|---|---|---|---|---|---|---|
| | None | Stop Sign | Yield Sign | Signal Red | Signal Amber | Signal Green | Other |
| Single Vehicle | | | | | | | |
| Motorcycle not involved N=8,632 | 85.3% | 5.2% | 2.3% | 1.4% | 0.4% | 3.8% | 1.6% |
| Motorcycle involved N=603 | 85.7% | 5.3% | 2.8% | 1.5% | 0.3% | 2.7% | 1.7% |
| Multiple Vehicle | | | | | | | |
| Motorcycle not involved N=17,440 | 55.8% | 18.9% | 2.2% | 10.3% | 2.2% | 8.1% | 2.4% |
| Motorcycle involved N=1,416 | 61.2% | 19.5% | 1.5% | 4.4% | 2.5% | 9.1% | 1.8% |

Table 9
Weather Conditions During Casualty Accidents:
Non-Motorcycle *vs.* Motorcycle
British Columbia, 1986.

| Casualty Accident Type | WEATHER CONDITION | | | | |
|---|---|---|---|---|---|
| | Clear | Cloudy | Raining | Snow/ Sleet | Other |
| Single Vehicle | | | | | |
| Motorcycle not involved N=8,808 | 47.4% | 29.5% | 16.1% | 4.5% | 2.5% |
| Motorcycle involved N=617 | 65.5% | 28.0% | 5.7% | 0.2% | 0.6% |
| Multiple Vehicle | | | | | |
| Motorcycle not involved N=17,890 | 48.9% | 26.5% | 21.3% | 2.2% | 1.1% |
| Motorcycle involved N=1,448 | 66.6% | 25.1% | 7.7% | 0.1% | 0.5% |

Table 10
Road Surface Characteristics at Casualty Accidents:
Non-Motorcycle *vs.* Motorcycle
British Columbia, 1986.

| Casualty Accident Type | ROAD SURFACE CONDITION | | | | | |
|---|---|---|---|---|---|---|
| | Dry | Wet | Muddy | Snow | Slush | Ice |
| Single Vehicle | | | | | | |
| Motorcycle not involved N=8,784 | 56.6% | 28.0% | 0.6% | 3.9% | 2.0% | 8.9% |
| Motorcycle involved N=609 | 87.0% | 12.0% | 0.2% | 0.2% | 0.2% | 0.5% |
| Multiple Vehicle | | | | | | |
| Motorcycle not involved N=17,945 | 61.7% | 33.3% | 0.1% | 1.9% | 0.8% | 2.3% |
| Motorcycle involved N=1,450 | 87.0% | 12.8% | 0.1% | 0.0% | 0.1% | 0.1% |

### Table 11
### Horizontal Road Surface Characteristics at Casualty Accidents: Non-Motorcycle vs. Motorcycle British Columbia, 1986.

| Casualty Accident Type | HORIZONTAL ROAD CHARACTERISTICS | | | | |
|---|---|---|---|---|---|
| | Straight | Curve | Sharp Curve | Switch-back | Winding Curves |
| **Single Vehicle** | | | | | |
| Motorcycle not involved N=8,291 | 59.2% | 24.6% | 10.1% | 1.2% | 4.9% |
| Motorcycle involved N=583 | 48.5% | 27.3% | 16.0% | 2.4% | 5.8% |
| **Multiple Vehicle** | | | | | |
| Motorcycle not involved N=15,338 | 87.8% | 8.7% | 2.4% | 0.3% | 0.9% |
| Motorcycle involved N=1,318 | 84.6% | 10.8% | 2.7% | 0.4% | 1.5% |

### Table 12
### Vertical Road Surface Characteristics at Casualty Accidents: Non-Motorcycle vs. Motorcycle British Columbia, 1986.

| Casualty Accident Type | VERTICAL ROAD CHARACTERISTICS | | |
|---|---|---|---|
| | Flat | Some Grade | Steep Grade |
| **Single Vehicle** | | | |
| Motorcycle not involved N=8,180 | 59.2% | 33.2% | 7.7% |
| Motorcycle involved N=580 | 57.8% | 35.3% | 6.9% |
| **Multiple Vehicle** | | | |
| Motorcycle not involved N=15,181 | 69.9% | 26.5% | 3.6% |
| Motorcycle involved N=1,297 | 68.9% | 27.0% | 4.2% |

### Table 13
### Speed Zones of Casualty Accidents: Non-Motorcycle vs. Motorcycle British Columbia 1986.

| Casualty Accident Type | SPEED ZONE | | | | | | |
|---|---|---|---|---|---|---|---|
| | 0-40 kph | 50 kph | 60 kph | 70 kph | 80 kph | 90 kph | 100 kph |
| **Single Vehicle** | | | | | | | |
| Motorcycle not involved N=7,803 | 6.0% | 43.9% | 13.3% | 2.0% | 18.0% | 14.8% | 2.0% |
| Motorcycle involved N=543 | 9.5% | 48.1% | 7.5% | 2.0% | 16.2% | 7.7% | 0.9% |
| **Multiple Vehicle** | | | | | | | |
| Motorcycle not involved N=14,660 | 4.4% | 67.3% | 14.2% | 2.4% | 7.4% | 3.7% | 0.6% |
| Motorcycle involved N=1,253 | 4.7% | 73.4% | 11.3% | 1.4% | 6.0% | 2.9% | 0.3% |

motorcycles (4.9%). On the other hand, motorcycle-involved accidents had a lower proportion of commercial vehicle (e.g. bus, truck, taxi etc.) involvement (2% vs. 5%) and bicycle involvement (1.6% vs. 7.5%), and a higher proportion of out-of-province driver involvement (15.0 vs. 8.8%) than did non-motorcycle-involved casualty traffic accidents.

Pre-Collision Events, Collision Events, and Contributing Factors:

Tables 14 to 16 compare single-vehicle casualty traffic accidents involving motorcycles with those involving other motor vehicles. In terms of pre-collision action (Table 14), the majority of both motorcyclists and other drivers were "going straight" (65%), while "skidding" was the second most frequently cited pre-collision action for both groups (motorcycle, 8.4%; not motorcycle, 9.1%). Table 15 shows that both motorcyclists and other motor vehicle drivers in single-vehicle collisions tended to run of the road either to the right or left, with motorcyclists being more likely to run off to the right (60.2% vs. 47.5%). Finally, in terms of the single primary factor (Table 16) contributing to the accident associated with each driver/vehicle entity, the causes of single-vehicle casualty accidents involving motorcycles were very similar to the causes of single-vehicle casualty accidents not involving motorcycles. That is, the factors of alcohol, driving without due care, and unsafe speed were frequently cited for both sorts of vehicles. Driver inexperience and weather were the only noteworthy differences, with inexperience cited at 11.6% for motorcyclists and 4.9% for drivers of other vehicles in single-vehicle casualty accidents

### Table 14
### Pre-collision Action of Vehicles in Single Vehicle Casualty Accidents: Non-Motorcycle vs. Motorcycle
### British Columbia, 1985.

| Casualty Accident | PRE-COLLISION ACTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Going straight | Right turn | Left turn | Slowing/ Stopping | Stopped in Traffic | Avoid Object | Change lanes | Over-taking | Backing | Skidding | Swerving | Other |
| Motorcycle not involved N=8,664 | 65.0% | 5.0% | 6.4% | 1.1% | 0.1% | 1.0% | 0.5% | 0.9% | 1.8% | 9.1% | 3.5% | 5.6% |
| Motorcycle involved N=593 | 65.3% | 7.1% | 8.3% | 3.0% | 0.0% | 1.0% | 1.3% | 1.3% | 0.0% | 8.4% | 2.4% | 1.9% |

### Table 15
### Vehicle Manoeuver at Point of Impact in Casualty Accidents: Single Vehicle Casualty Accidents, Non-motorcycle vs. Motorcycle
### British Columbia, 1986.

| Motorcycle Accident | VEHICLE MANOEUVER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rear End | Head On | Side Swipe | Inter-secting at 90° | Over-taking | Right turn | Left turn | Run off road to right | Run off road to left | Other |
| No N=6,327 | 0.6% | 2.3% | 0.7% | 6.8% | 0.3% | 0.6% | 1.6% | 47.5% | 35.2% | 4.4% |
| Yes N=352 | 1.1% | 3.4% | 0.6% | 1.4% | 1.7% | 0.6% | 1.8% | 60.2% | 24.4% | 4.8% |

### Table 16
### Single Vehicle Casualty Accidents - Primary Contributing Factors
### Non-Motorcycle vs. Motorcycle.
### British Columbia, 1986.

| Casualty Accident | Alcohol | Cutting In | W/out Due Care | Inexper-ience | Fail to yield | Improper Passing | Wrong Side of Road | Traffic Signal Ignored | Improper Turning | Unsafe Speed | Vehicle Fault | Visibi-lity Impaired | Backing Unsafely | Glare | Tail gate | Weather | Animal | Does not apply |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Motorcycle Not Involved N=8,170 | 20.2% | 0.5% | 17.5% | 4.9% | 3.6% | 0.3% | 0.4% | 0.6% | 0.4% | 11.0% | 3.7% | 1.2% | 1.0% | 0.6% | 0.1% | 8.9% | 4.2% | 12.9% |
| Motorcycle Involved N=540 | 17.5% | 0.6% | 17.3% | 11.6% | 0.2% | 0.9% | 0.4% | 0.6% | 0.4% | 15.4% | 3.3% | 0.2% | 0.0% | 0.8% | 0.2% | 2.8% | 8.7% | 8.3% |

and weather cited 2.8% for motorcyclists and 8.9% for other vehicle drivers. However, overall it would appear that single-vehicle casualty traffic accidents involving motorcyclists did not differ greatly from those not involving motorcyclists.

Turning to multiple-vehicle casualty traffic accidents, Tables 17 to 19 show the pre-collision events, vehicle manoeuver at point of impact, and primary factor contributing to the accident for each driver/vehicle entity. Considering the pre-collision events, motorcyclists tended to be "going straight" (75.8%), while the other vehicle in the motorcycle-involved multiple-vehicle casualty accident tended to be making a left turn (39.9%), was "going straight" (31.4%), or was changing lanes (5.3%). At point of impact, the vehicles in motorcycle-involved multiple-vehicle casualty accidents were intersecting at 90° (31.3%), making a left turn (24.3%), or one hit the other from behind (19.2%).

The primary factors contributing to the casualty accident associated with each driver/vehicle entity for multiple-vehicle accidents involving motorcycles as well as those not involving motorcycles can be found in Table 19. For motorcycles in these multiple-vehicle accidents, no primary contributing factor could be assigned in 51% of the instances, while for the other motor vehicles, no primary contributing factor could be assigned in 44.2% of the instances. Factors that were assigned to motorcyclists included driving without due care (11.6%), unsafe speed (7.0%), alcohol (5.6%), improper passing (4.3%), and failure to yield right of way (4.2%), while for other vehicles involved in

### Table 17
### Pre-collision Action of Vehicles in Multiple-vehicle Casualty Accidents: Non-Motorcycle vs. Motorcycle British Columbia, 1986.

| Casualty Accident | PRE-COLLISION ACTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Going straight | Right turn | Left turn | Slowing/ Stopping | Stopped in Traffic | Avoid Object | Change lanes | Over-taking | Backing | Skidding | Swerving | Other |
| **Motorcycle not involved** | | | | | | | | | | | | |
| VEHICLE 1 N=17,830 | 51.8% | 4.2% | 14.8% | 5.2% | 11.2% | 0.3% | 1.6% | 1.2% | 1.0% | 2.8% | 1.0% | 4.9% |
| VEHICLE 2 N=17,584 | 61.5% | 2.2% | 9.5% | 5.9% | 10.6% | 0.2% | 1.2% | 0.8% | 0.6% | 1.5% | 0.7% | 5.3% |
| **Motorcycle involved** | | | | | | | | | | | | |
| MOTORCYCLE N=1,443 | 75.8% | 2.6% | 5.4% | 2.3% | 1.7% | 0.3% | 1.8% | 5.3% | 0.0% | 2.3% | 1.1% | 1.4% |
| OTHER VEHICLE N=1,402 | 31.4% | 5.1% | 39.9% | 2.7% | 3.9% | 0.2% | 5.3% | 1.2% | 1.1% | 0.7% | 0.4% | 8.1% |

### Table 18
### Vehicle Manoeuver at Point of Impact in Casualty Accidents: Multiple Vehicle Casualty Accidents, Non-motorcycle vs. Motorcycle British Columbia, 1986.

| Casualty Accident | VEHICLE MANOEUVER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rear End | Head On | Side Swipe | Inter-secting at 90° | Over-taking | Right turn | Left turn | Run off road to right | Run off road to left | Other |
| Motorcycle not involved N=15,323 | 42.3% | 5.5% | 3.7% | 29.3% | 3.0% | 1.2% | 11.5% | 1.5% | 1.2% | 0.8% |
| Motorcycle involved N=1,154 | 19.2% | 5.3% | 5.5% | 31.3% | 9.0% | 1.7% | 24.3% | 1.6% | 0.8% | 1.3% |

Table 19
Multiple Vehicle Casualty Accidents - Primary Contributing Factors, Vehicles:
Non-Motorcycle vs. Motorcycle.
British Columbia, 1986.

| Casualty Accident | Alcohol | Cutting In | W/out Due Care | Inexperience | Fail to yield | Improper Passing | Wrong Side of Road | Traffic Signal Ignored | Improper Turning | Unsafe Speed | Vehicle Fault | Visibility Impaired | Backing Unsafely | Glare | Tailgate | Weather | Does Not Apply |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Motorcycle Not Involved** | | | | | | | | | | | | | | | | | |
| VEHICLE 1<br>N=16,629 | 5.9% | 1.0% | 14.4% | 1.3% | 14.4% | 0.8% | 1.0% | 4.8% | 1.4% | 3.0% | 1.1% | 0.9% | 0.7% | 0.4% | 6.0% | 2.6% | 38.6% |
| VEHICLE 2<br>N=16,533 | 2.1% | 0.6% | 6.2% | 0.7% | 4.7% | 0.6% | 1.1% | 1.4% | 0.7% | 1.7% | 0.9% | 0.5% | 0.3% | 0.1% | 3.0% | 1.8% | 72.4% |
| **Motorcycle Involved** | | | | | | | | | | | | | | | | | |
| MOTORCYCLE<br>N=1,341 | 5.6% | 1.0% | 11.6% | 3.4% | 4.2% | 4.3% | 0.6% | 2.3% | 0.7% | 7.0% | 1.2% | 0.5% | 0.3% | 0.1% | 3.7% | 1.0% | 51.0% |
| OTHER VEHICLE<br>N=1,315 | 3.3% | 2.7% | 8.7% | 1.0% | 26.8% | 1.0% | 0.8% | 2.1% | 3.6% | 0.6% | 0.6% | 1.1% | 0.7% | 0.2% | 0.8% | 0.2% | 44.2% |

Table 20
Driver Characteristics,
Non-motorcycle vs. Motorcycle Casualty Traffic Accidents.
British Columbia, 1986

| Casualty Accident Type | N | % Male Drivers | Average Driver Age |
|---|---|---|---|
| **Single Vehicle** | | | |
| Motorcycle not Involved | 8,479 | 72.5% | 31.5 yrs. |
| Motorcycle Involved | 614 | 95.1% | 27.6 yrs. |
| **Multiple Vehicle** | | | |
| Motorcycle not Involved | | | |
| Vehicle 1 | 17,382 | 66.6% | 35.5 yrs. |
| Vehicle 2 | 16,902 | 68.9% | 34.2 yrs. |
| Motorcycle Involved | | | |
| Motorcycle | 1,449 | 96.5% | 26.7 yrs. |
| Other Vehicle | 1,304 | 67.8% | 37.3 yrs. |

motorcycle-related multiple-vehicle casualty accidents, failure to yield right of way was the most frequently cited cause (26.8%), followed by driving without due care (8.7%).

Comparing multiple-vehicle casualty accidents that did not involve motorcycles with those that did involve motorcycles, those involving motorcycles appeared to be more likely than those not involving motorcycles to be associated with a left turn and failure to yield right of way on the part of the vehicle other than the motorcycle. For example, a "left turn" pre-collision action in motorcycle-involved multiple-vehicle casualty accidents was 5.4% for the motorcyclist and 39.9% for the other vehicle, while for multiple-vehicle casualty accidents not involving motorcycles "left turn" was recorded for 14.8% of "Vehicle #1" and 9.5% of "Vehicle #2". Similarly, "failure to yield" was recorded for 4.2% of the motorcycles and 26.8% of the other vehicle in those motorcycle-involved accidents and was recorded 14.4% for "Vehicle #1" and 4.7% for "Vehicle #2" in multiple-vehicle accidents not involving motorcycles.

## PERSONS INVOLVED AND CONSEQUENCES:

As can be seen from Table 20, over 95% of the motorcyclists in either single or multiple vehicle accidents were male, while about 73% of other motorists in single-vehicle accidents and 67% of other motorists in multiple-vehicle accidents were male.

In addition, as can be seen from Table 20 and Figures 3 and 4, motorcyclists in single-vehicle accidents averaged about 3 years younger than other motorists in single-vehicle accidents and 7 to 10 years younger than other motorists in multiple-

Figure 3. Single Veh. Casualty Acc.: Driver Age

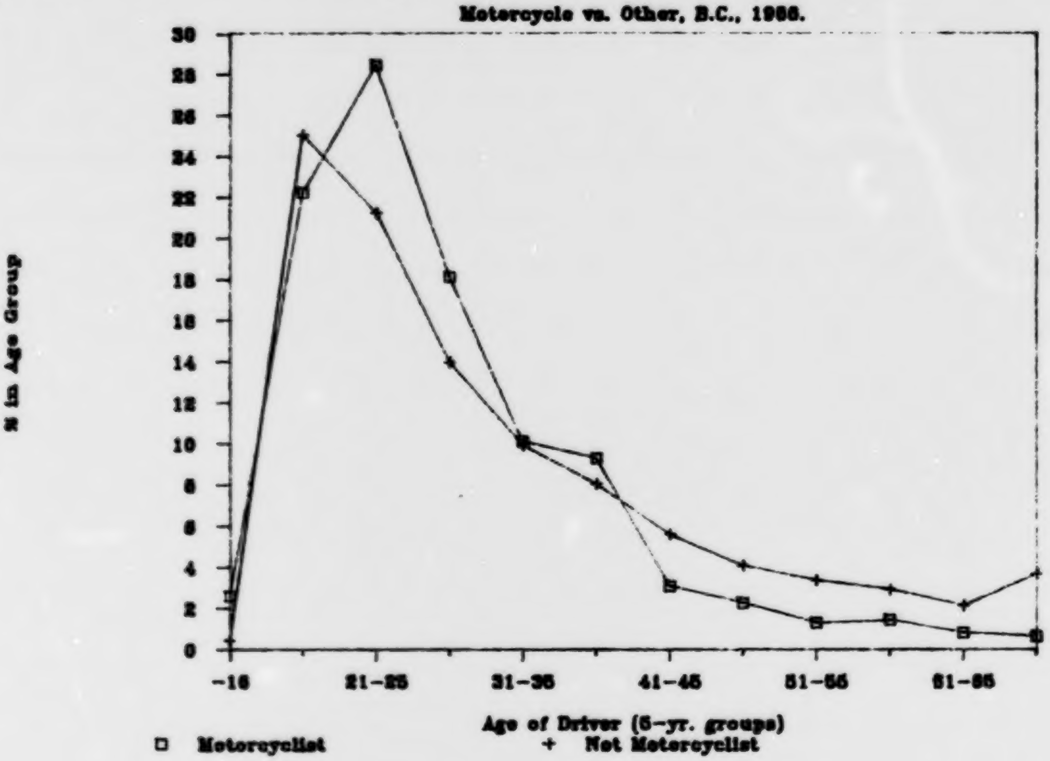
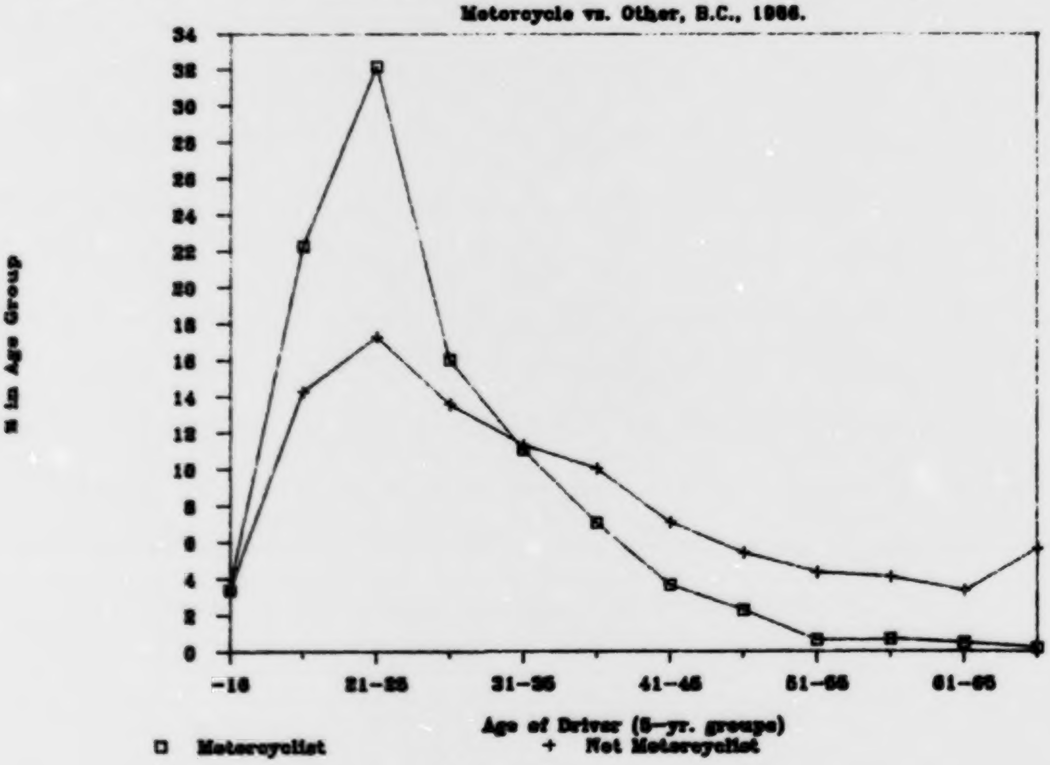


Figure 4. Multiple Veh. Casualty Acc.: Driver Age



vehicle accidents. Overall, the average age of motorcyclists in casualty traffic accidents was about 27 years. Finally, about 20% of the motorcyclists in single-vehicle casualty accidents and 14% of the motorcyclists in multiple-vehicle casualty accidents carried passengers, while of those on these motorcycles the accident records show that 5% were not wearing helmets, 85% were wearing helmets and for 10% it was not known whether or not helmets were worn.

Turning to the casualties produced by motorcycle accidents in B.C. in 1986, there were 49 motorcycle drivers and 8 motorcycle passengers killed in a total of 53 fatality-producing accidents and there were 1,961 motorcycle drivers and 321 motorcycle passengers injured in the 2,066 injury-producing motorcycle accidents. As can be seen from Table 21 to 23, individuals on motorcycles were more likely to sustain more serious injuries in accidents than were those individuals in other types of vehicles, and were more likely to sustain injuries in other than the head. (It must be noted that these injury assessments were done by the police accident investigation team, not necessarily by a physician.) Unlike accidents involving other vehicles in which single-vehicle accidents tended to produce more severe injuries than multiple-vehicle accidents, injuries sustained by individuals on motorcycles appeared to be similar in both single and multiple-vehicle accidents.

Finally, Tables 24 and 25 show that motorcycles sustained heavier damage than did other vehicles in multiple-vehicle accidents, but sustained lighter damage than other vehicles in single-vehicle accidents.

Table 21
Victims' Injury Location:
Motorcycle vs. Non-motorcycle Casualty Accidents.
British Columbia, 1986.

| Casualty Accident Type | INJURY LOCATION | | | | | | |
|---|---|---|---|---|---|---|---|
| | No Injury | Head/ Neck | Chest/ Back | Arm/ Shoulder | Abdomen/ Hip | Lower Leg | All Body |
| **Single Vehicle** | | | | | | | |
| Motorcycle not involved N=17,037 | 32.7% | 31.8% | 9.1% | 10.2% | 5.3% | 8.1% | 2.7% |
| Motorcycle involved N=738 | 6.4% | 17.6% | 10.0% | 22.4% | 9.9% | 26.0% | 7.7% |
| **Multiple Vehicle** | | | | | | | |
| Motorcycle not involved N=57,446 | 52.7% | 26.6% | 6.8% | 4.4% | 4.5% | 4.2% | 0.8% |
| Motorcycle involved MOTORCYCLE N=1,665 | 7.4% | 11.1% | 7.6% | 18.8% | 14.7% | 33.9% | 6.5% |
| OTHER VEH. N=2,043 | 91.6% | 2.3% | 1.1% | 1.9% | 0.8% | 1.8% | 0.5% |

Table 22
Victims' Injury Type:
Motorcycle vs. Non-Motorcycle Casualty Accidents.
British Columbia, 1986.

| Casualty Accident Type | INJURY TYPE | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | Abrasion | Bruise | Laceration | Bleeding | Fracture | Dislocation | Burn | Amputation | Concussion | Drowning | Whiplash |
| **Single Vehicle** | | | | | | | | | | | | |
| Motorcycle not involved N=17,037 | 36.3% | 7.5 | 25.3% | 12.2% | 6.0% | 7.4% | 1.4% | 0.1% | 0.1% | 1.7% | 0.1% | 2.0% |
| Motorcycle involved N=738 | 10.1% | 24.3% | 19.7% | 14.8% | 4.3% | 20.1% | 3.7% | 0.1% | 0.0% | 2.6% | 0.0% | 0.3% |
| **Multiple Vehicle** | | | | | | | | | | | | |
| Motorcycle not involved N=57,446 | 61.5% | 3.9% | 16.1% | 3.8% | 2.2% | 1.9% | 1.0% | 0.0% | 0.0% | 0.9% | 0.0% | 0.6% |
| Motorcycle involved MOTORCYCLE N=1,665 | 14.0% | 18.4% | 20.2% | 10.0% | 4.9% | 19.2% | 2.6% | 0.5% | 0.2% | 1.2% | 0.0% | 0.8% |
| OTHER VEH. N=2,043 | 90.1% | 1.6% | 3.4% | 1.8% | 0.6% | 1.0% | 0.2% | 0.0% | 0.1% | 0.3% | 0.0% | 0.9% |

### Table 23
### Victim's State of Consciousness: Motorcycle vs. Non-Motorcycle Casualty Accidents. British Columbia, 1986.

| Casualty Accident Type | STATE OF CONSCIOUSNESS | | | | | |
|---|---|---|---|---|---|---|
| | Appears Normal | Agitated | Incoherent | Semi-conscious | Unconscious | Appears Dead |
| Single Vehicle | | | | | | |
| Motorcycle not involved N=17,037 | 78.8% | 12.6% | 1.9% | 3.7% | 1.3% | 1.7% |
| Motorcycle involved N=738 | 69.4% | 15.7% | 2.6% | 7.7% | 2.6% | 2.0% |
| Multiple Vehicle | | | | | | |
| Motorcycle not involved N=57,446 | 91.3% | 6.2% | 0.6% | 1.2% | 0.3% | 0.4% |
| Motorcycle involved | | | | | | |
| MOTORCYCLE N=1,665 | 72.9% | 16.3% | 1.9% | 5.4% | 1.0% | 2.5% |
| OTHER VEH. N=2,043 | 97.2% | 2.1% | 0.3% | 0.4% | 0.0% | 0.0% |

### Table 25
### Damage Severity - Multiple Vehicles in Casualty Accidents: Non-Motorcycle vs. Motorcycle British Columbia, 1986.

| Casualty Accident | DAMAGE SEVERITY | | | | |
|---|---|---|---|---|---|
| | No Damage | Light Damage | Moderate Damage | Severe Damage | Demolished |
| Motorcycle Not Involved | | | | | |
| VEHICLE 1 N=16,259 | 8.8% | 32.4% | 30.8% | 19.7% | 8.3% |
| VEHICLE 2 N=15,225 | 6.6% | 31.0% | 32.9% | 21.0% | 8.5% |
| Motorcycle Involved | | | | | |
| MOTORCYCLE N=1,364 | 3.4% | 36.2% | 34.1% | 17.0% | 9.3% |
| OTHER VEHICLE N=2,080 | 16.3% | 46.8% | 27.3% | 7.7% | 1.9% |

### Table 24
### Damage Severity - Single Vehicles in Casualty Accidents: Non-Motorcycle vs. Motorcycle British Columbia, 1986.

| Casualty Accident | DAMAGE SEVERITY | | | | |
|---|---|---|---|---|---|
| | No Damage | Light Damage | Moderate Damage | Severe Damage | Demolished |
| Motorcycle Not Involved N=8,242 | 13.5% | 12.6% | 19.4% | 26.1% | 28.4% |
| Motorcycle Involved N=2,080 | 6.8% | 37.6% | 35.0% | 13.4% | 7.3% |

## CONCLUSIONS

Motorcycle accidents comprised about 8% of the total number of casualty traffic accidents in British Columbia between 1980 and 1986, and followed a seasonal cycle, peaking in the July-August period. In 1986, about 30% of these were single-vehicle accidents and the remainder involved a motorcycle and another motor vehicle.

Single-vehicle motorcycle casualty accidents tended to occur in the afternoon and evening periods, toward the end of the week, and in rural areas at a curve in the road. Typically, the motorcycle ran off the road to the right and the accident was caused by driving without due care (17%), alcohol (17%), speeding (15%), or inexperience (11%). The average age of the motorcycle rider was about 27 years, 95% were male, and 20% carried passengers.

On the other hand, multiple-vehicle motorcycle casualty accidents typically occurred in the afternoon and early evening, toward the end of the week, in business and residential areas, and at an intersection. Typically, the motorcycle was struck by a driver of another vehicle who was turning left and failed to yield the right of way. Similar to single-vehicle motorcycle accidents, the motorcyclists in these accidents averaged about 27 years of age, and about 95% were male. However, only about 14% carried passengers.

In terms of accident countermeasures, for single-vehicle motorcycle accidents, the role of inexperience might prove to be a useful focus, while motorcycle conspicuity and programs aimed at making other drivers aware of motorcycles could be a profitable direction in reducing multiple-vehicle motorcycle accidents.

# Bicycle/Motor Vehicle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

## SUMMARY

To summarize, between 1980 and 1986 bicycle/motor vehicle casualty-producing accidents comprised about 7% of all casualty traffic accidents in British Columbia, ranging from about 14% to 17% in July-August to about 2% to 4% in December-January. They tended to occur in urban areas, at intersections, in the Spring-to-Fall period, in good weather, on weekdays, and in daylight. In the majority of these accidents there was no traffic control device in place, although in 20% there was a stop sign and in 13% there was a traffic light. About 10% were hit-and-run.

Typically, the casualty accident itself involved both the motor vehicle and the cyclist "going straight" and colliding at 90° at an intersection. The next most frequent accident configuration involved the motor vehicle making a right or left turn and colliding with the cyclist who was "going straight". The third most frequent bicycle/motor vehicle collision occurred when the motor vehicle was passing or "overtaking" the cyclist.

Turning to the primary factors contributing to these accidents (as determined by the investigating police officers), there were no contributing factors assigned to about 50% of the cyclists and about 60% of the motorists. Where contributing factors were indicated, for motorists the most frequent were Failure to Yield the Right of Way (37%), Driving Without Due Care and Attention (24%), and Visibility Impaired (7%) while for cyclists they were Driving Without Due Care and Attention (26%), Failure to Yield Right of Way (15%), and Wrong Side of Road (12%).

Cyclists involved in these bicycle/motor vehicle casualty accidents were three times as likely to be male than female, and had an average age of 22 years, with about 70% being over 16 years of age and half falling between 16 and 30 years. Head injuries or lower leg injuries were the most frequent outcomes for cyclists (27% each), followed by arm/shoulder injuries (22%). Of the 2,096 casualties, 17 or 0.8% were fatalities.

These results suggest two directions for countermeasures that might reduce bicycle/motor vehicle casualty accidents: public education on the legitimacy of cyclists as road users and public education emphasizing improvememts in bicycle conspicuity. Argument for the latter stems from the fact that for motorists in bicycle/motor vehicle collisions "visibility impaired" and for cyclists "defective headlights" are both contributing factors that could be reduced if the cyclist was more visible. However, it would appear that the larger (although perhaps less soluble) problem has to do with neither cyclists nor motorists recognizing that cyclists have similar rights and responsibilities on the public roads as do any other road users.

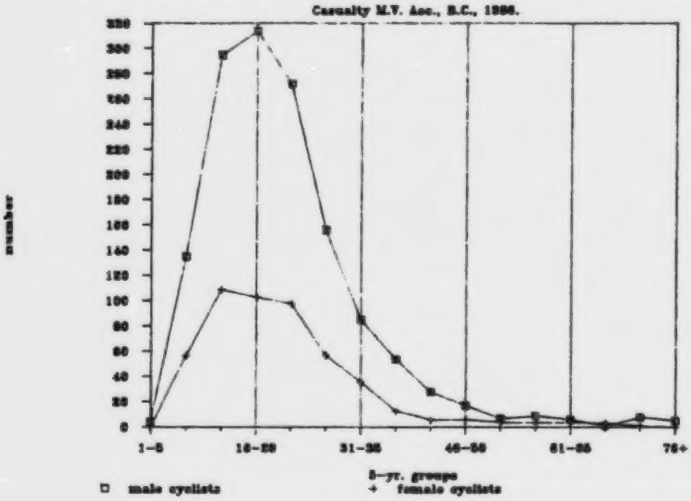
In more detail, for motorists in these accidents, Driving Without Due Care and Attention (24%) and Failure to Yield Right of Way (37%) suggest that the driver is not treating the bicycle in the same way that another motor vehicle would be treated. For cyclists, the contributing factors of Due Care (26%), Failure to Yield (15%), Wrong Side of Road (12%) and Signal Ignored (8%) suggest that they are not riding the bicycle with the same respect for other road users or for the laws that they would have if they were driving a motor vehicle. Indeed, the fact that about 70% of these cyclists are 16 years of age or older and probably have a drivers' licences, opens up possible driver licence-related as well as public education responses to this situation.

Finally, with the increasing costs of owning and operating a motor vehicle and with the increasing emphasis on fitness and "lifestyle" (e.g. triathlons), one would not expect these casualty traffic accidents to decrease in the future.

Figure 3

Age & Gender, Bicyclists.

Casualty M.V. Acc., B.C., 1986.



# Bicycle/Motor Vehicle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

Bicycles are the most energy-efficient form of transportation known. They are inexpensive, easy to repair and their use promotes fitness. They are available in a wide range of sizes and types - racing bicycles, touring bicycles, "mountain" bicycles - and are used by those too young to drive, those who want to save money on transportation, those who want to get fit, couriers, and so on.

On the other hand, unlike other vehicles, their use is largely unregulated and the road infrastructure was not built to accommodate bicycles. Indeed, it can be argued that, when compared to the rest of the world, widespread bicycle use is new to the North American culture and therefore social rules and regulations concerning their place in traffic in particular and in society in general have not yet had time to evolve. However, theoretical speculation aside, the fact remains that collisions between motor vehicles and bicycles caused over 2,000 casualties in British Columbia in 1986 and comprised about 1 in 14 traffic accidents that caused either injury or death. Consequently, it is the purpose of this research paper to investigate the trends, characteristics, persons involved, and consequences of casualty-producing bicycle/motor vehicle traffic accidents both in order to determine their causes and configurations, and to suggest countermeasures to reduce their frequency and severity.

## METHOD

In order to examine trends in bicycle/motor vehicle casualty accidents (i.e. an accident where one or more persons were injured or killed), police Traffic Accident Reports (MV104) were examined from 1980 to 1986, while a detailed analysis of these accidents was drawn from the 1986 MV104 casualty accident reports. As the raw data from these police reports are managed by the Motor Vehicle Department of the Ministry of Transportation and Highways, and as that Department is constantly improving their data base, any statistics produced by that Department that contradict those reported herein ought to be considered as the more accurate.

## RESULTS

### Trends and Patterns:

From Table 1 and Figure 1 it can be seen that the proportion of casualty traffic accidents involving motor vehicles and bicycles has ranged between a low of 3.7% in 1981 and a high of 8.8% in 1985, and that no strong trend is apparent. Both Figure 1 and Figure 2 show that these sorts of accidents followed a seasonal cycle, with a range from about 14% to 17% in July-August to 2% to 4% in December-January.

### CASUALTY ACCIDENT CHARACTERISTICS:

### Time, Location and Conditions:

In addition to being most frequent in the summer months, casualty motor vehicle accidents involving bicycles, unlike casualty motor vehicle accidents not involving bicycles, tended

Table 1
Casualty Accident Frequencies: Year by Percentage Bicycle Accidents

| YEAR | TOTAL # OF CASUALTY ACCIDENTS | % INVOLVING BICYCLE |
|---|---|---|
| 1980 | 29,268 | 4.1% |
| 1981 | 31,455 | 3.7% |
| 1982 | 24,262 | 8.4% |
| 1983 | 23,089 | 6.8% |
| 1984 | 23,440 | 8.8% |
| 1985 | 25,155 | 7.5% |
| 1986 | 29,138 | 7.0% |

Table 2
Day of Week of Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | DAY OF WEEK | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| No | 12.1% | 12.7% | 13.8% | 14.0% | 16.8% | 17.7% | 12.9% |
| Yes | 15.8% | 14.4% | 17.0% | 15.2% | 16.8% | 12.5% | 8.2% |
| B.C. Total | 12.4% | 12.8% | 14.0% | 14.1% | 16.8% | 17.3% | 12.6% |

Table 3
Time of day of Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | TIME OF DAY (two hour intervals) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Midnight 2:00 AM | 2:00 AM 4:00 AM | 4:00 AM 6:00 AM | 6:00 AM 8:00 AM | 8:00 AM 10:00 AM | 10:00 AM NOON | NOON 2:00PM | 2:00 PM 4:00 PM | 4:00 PM 6:00 PM | 6:00 PM 8:00 PM | 8:00 PM 10:00 PM | 10:00 PM Midnight |
| No | 6.0% | 4.6% | 2.1% | 5.1% | 7.9% | 9.1% | 10.5% | 14.5% | 15.5% | 10.5% | 7.8% | 6.5% |
| Yes | 1.4% | 0.6% | 0.2% | 4.5% | 8.2% | 8.7% | 13.3% | 18.9% | 21.9% | 12.4% | 6.6% | 3.2% |
| B.C. Total | 5.6% | 4.3% | 1.9% | 5.0% | 7.9% | 9.1% | 10.7% | 14.8% | 16.0% | 10.7% | 7.7% | 6.3% |

Figure 1
% of Casualty Traffic Accidents Involving Bicycles
British Columbia, Jan. 1980- Dec. 1986.

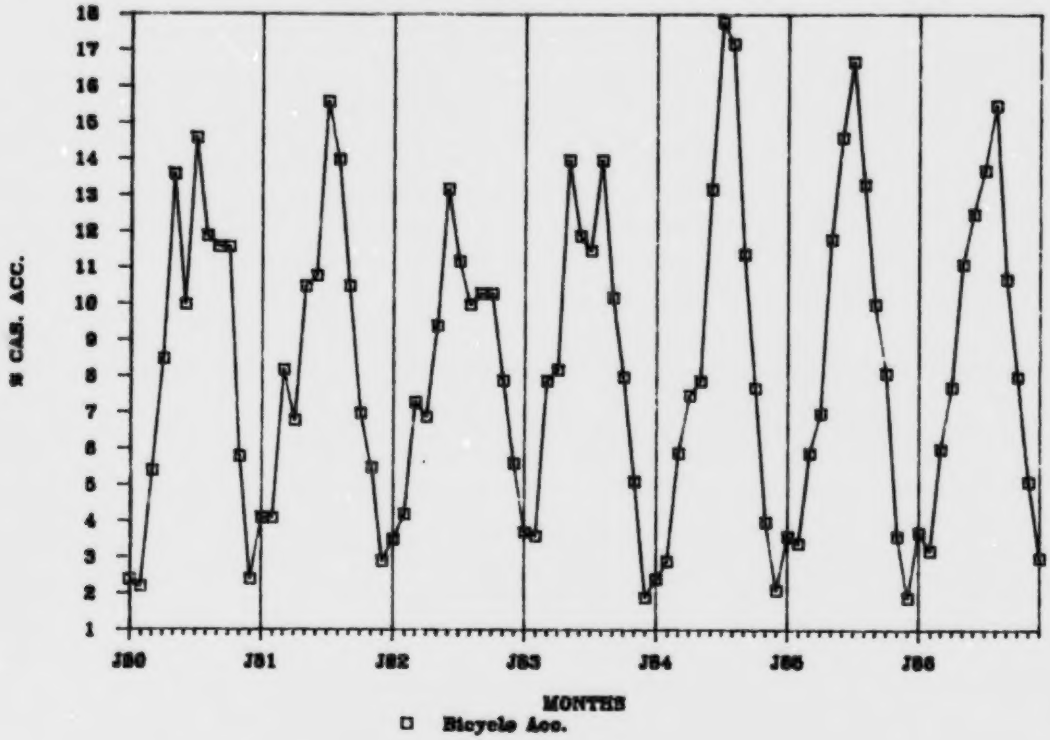
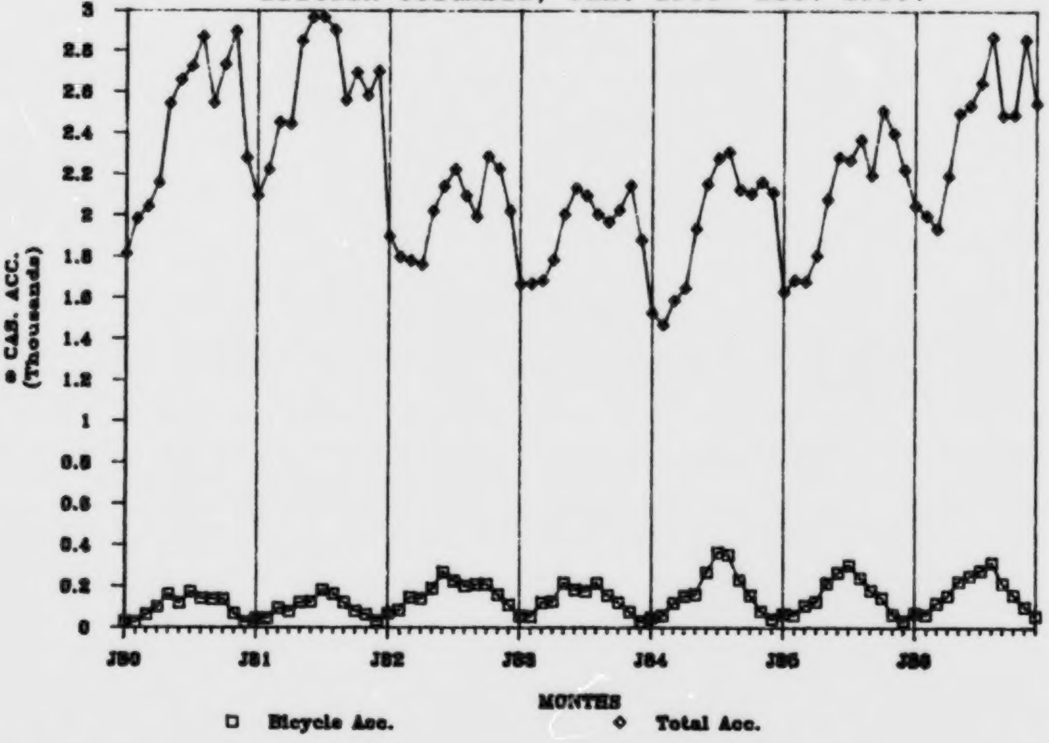


Figure 2
# of Bicycle-Involved & Total # of Casualty Traffic Accidents
British Columbia, Jan. 1980- Dec. 1986.



to occur more frequently on weekdays and less frequently on weekends, as is shown by Table 2. Further, as can be seen from Tables 3 and 4, these accidents appeared to concentrate into daylight hours more than did non-bicycle motor vehicle accidents.

Table 5 shows that casualty motor vehicle accidents involving bicycles occurred in higher proportions in municipal, as opposed to rural areas, with the Victoria area having the highest proportion at 16.0%. As would be expected from Table 5, Table 6 shows these accidents occurred most frequently in Business/Shopping areas (42.5%), followed by Family/Residential areas (35.6%) and least frequently in Agricultural (3.1%) and Recreational (1.5%) areas. More specifically, bicycle/motor vehicle casualty accidents occurred more frequently at intersections (52.6% vs. 45.4%) and "T" junctions (13.8% vs. 6.0%) than did other motor vehicle casualty accidents, as is shown in Table 7. Finally, the majority (82.4%) of bicycle/motor vehicle accidents occurred in 50 Kmh speed zones, as opposed to only 58.0% for other motor vehicle accidents.

While a total of 66.4% of the bicycle/motor vehicle casualty accidents (as opposed to 51.4% of the other motor vehicle casualty accidents) occurred at either intersections or "T" junctions, only 36.4% of these accidents occurred where there was a traffic control device, as is shown by Table 8. It follows that about 30% occurred at unsigned intersections or "T" junctions.

Turning to the road and weather conditions, bicycle/motor vehicle casualty accidents occurred most frequently in clear

Table 4
Light Conditions During Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | LIGHT CONDITION | | | | | |
|---|---|---|---|---|---|---|
| | Day-Light | Dawn | Dusk | Night/Full Illumination | Night/Some Illumination | Night/No Illumination |
| No | 61.4% | 1.6% | 3.6% | 7.8% | 10.4% | 15.2% |
| Yes | 82.5% | 0.6% | 3.5% | 3.8% | 1.5% | 8.0% |
| B.C. Total | 62.9% | 1.5% | 3.6% | 7.5% | 9.8% | 14.7% |

Table 5
Percentage of Bicycle Accidents by Police Subdivision
British Columbia, 1986.

| LOCATION | Total # of Casualty Accidents | % Non-Bicycle Accidents | % Bicycle Accidents |
|---|---|---|---|
| Courtenay Municipal | 475 | 88.6% | 11.4% |
| Courtenay Rural | 761 | 97.2% | 2.8% |
| Kamloops Municipal | 747 | 93.4% | 6.6% |
| Kamloops Rural | 994 | 99.0% | 1.0% |
| Kelowna Municipal | 1,060 | 89.0% | 11.0% |
| Kelowna Rural | 1,093 | 96.8% | 3.2% |
| Nelson Municipal | 174 | 91.4% | 8.6% |
| Nelson Rural | 839 | 97.9% | 2.1% |
| Prince George Municipal | 755 | 92.7% | 7.3% |
| Prince George Rural | 872 | 99.1% | 0.9% |
| Prince Rupert Municipal | 190 | 87.4% | 12.6% |
| Prince Rupert Rural | 439 | 99.1% | 0.9% |
| Victoria Municipal | 727 | 92.2% | 7.8% |
| Victoria Rural | 865 | 95.3% | 4.7% |
| R.C.M.P. Lower Mainland | | | |
| Municipal | 8,218 | 93.3% | 6.7% |
| Rural | 848 | 95.3% | 4.7% |
| R.C.M.P. Freeway Patrol | 824 | 99.8% | 0.2% |
| Nelson Area Independents | 32 | 87.5% | 12.5% |
| Vancouver Area Independents | 7,477 | 91.0% | 9.0% |
| Victoria Area Independents | 1,723 | 84.0% | 16.0% |
| Other Police | 13 | 84.6% | 15.4% |
| British Columbia Total | 29,138 | 93.0% | 7.0% |

Table 6
Land Use at Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia 1986.

| Bicycle Accident | LAND USE | | | | | | |
|---|---|---|---|---|---|---|---|
| | School/ Playgrnd | Family Res. | Apart-ment | Business/ Shopping | Indus-trial | Agricul-tural | Recreation Camp/Park |
| No | 2.6% | 26.5% | 5.9% | 31.2% | 6.6% | 24.4% | 2.7% |
| Yes | 4.6% | 35.6% | 9.9% | 42.5% | 2.8% | 3.1% | 1.5% |
| | | | | | | | |
| B.C. Total | 2.8% | 27.2% | 6.2% | 32.0% | 6.3% | 22.9% | 2.6% |

Table 7
Locations of Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | ACCIDENT LOCATIONS | | | | |
|---|---|---|---|---|---|
| | Inter-section | Between intersections | "T" Junction | Bridge | Other |
| No | 45.4% | 40.6% | 6.0% | 2.3% | 5.6% |
| Yes | 52.6% | 29.4% | 13.8% | 0.3% | 3.9% |
| | | | | | |
| B.C. Total | 45.9% | 39.8% | 6.6% | 2.2% | 5.5% |

Table 8
Traffic Control Device at Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | TYPE OF TRAFFIC CONTROL | | | | | | |
|---|---|---|---|---|---|---|---|
| | None | Stop Sign | Yield Sign | Signal Red | Signal Amber | Signal Green | Other |
| No | 66.0% | 14.0% | 2.3% | 7.4% | 1.7% | 6.5% | 2.9% |
| Yes | 63.6% | 20.2% | 1.0% | 3.2% | 1.1% | 9.2% | 1.7% |
| | | | | | | | |
| B.C. Total | 65.8% | 14.4% | 2.2% | 7.1% | 1.6% | 6.7% | 2.2% |

Table 9
Weather Conditions During Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | WEATHER CONDITION | | | | |
|---|---|---|---|---|---|
| | Clear | Cloudy | Raining | Snow/ Sleet | Other |
| No | 48.4% | 27.6% | 19.5% | 2.9% | 1.6% |
| Yes | 66.7% | 24.7% | 8.0% | 0.3% | 0.3% |
| | | | | | |
| B.C. Total | 49.7% | 27.4% | 18.7% | 2.7% | 1.5% |

Table 10
Road Surface Characteristics at Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | ROAD SURFACE CONDITION | | | | | |
|---|---|---|---|---|---|---|
| | Dry | Wet | Muddy | Snow | Slush | Ice |
| No | 60.1% | 31.5% | 0.2% | 2.5% | 1.2% | 4.5% |
| Yes | 86.0% | 13.8% | 0.1% | 0.1% | 0.0% | 0.0% |
| | | | | | | |
| B.C. Total | 61.9% | 30.2% | 0.2% | 2.4% | 1.1% | 4.2% |

weather (66.7%), on dry roads (86.0%), and the roads were straight (92.3%) and flat (71.1%), as can be seen from Tables 9 through 12.

## Vehicles:

Virtually all of the bicycle/motor vehicle casualty accidents involved only one motor vehicle (98.4%), while only 35.2% of the other casualty traffic accidents involved only one motor vehicle. The proportion of bicycle/motor vehicle casualty accidents involving motorcycles was 1.6%, as opposed to 7.6% for other casualty traffic accidents, while the comparison for commercial vehicles was 2.3% vs. 4.9%, and for out-of-province vehicles was 2.9% vs. 9.7% respectively. In 10.8% of the bicycle/motor vehicle casualty accidents, the vehicle licence origin was not known, as opposed to only 1.3% of those casualty motor vehicle accidents that did not involve bicycles, and this fact is reflected in the relatively high proportion of hit-and-run accidents associated with bicycle/motor vehicle accidents (9.9% vs. 4.5%).

## Pre-Collision and Collision Events:

Table 13 shows the pre-collision activity of motor vehicles in non-bicycle casualty accidents, of motor vehicles in bicycle/motor vehicle casualty accidents, and of the bicycles in bicycle/motor vehicle casualty accidents. While for both sorts of accidents "going straight" was the most common activity, from this table it would appear that those accidents with bicycles were more likely to involve turns (18.9% right, 19.0% left) on the part of the motor vehicle. On the other hand, the bicycles in

Table 11
Horizontal Road Surface Characteristics at Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | HORIZONTAL ROAD CHARACTERISTICS | | | | |
|---|---|---|---|---|---|
| | Straight | Curve | Sharp Curve | Switch-back | Winding Curves |
| No | 76.3% | 15.0% | 5.5% | 0.7% | 2.5% |
| Yes | 92.3% | 5.9% | 1.1% | 0.1% | 0.6% |
| B.C. Total | 77.4% | 14.4% | 5.2% | 0.6% | 2.4% |

Table 12
Vertical Road Surface Characteristics at Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | VERTICAL ROAD CHARACTERISTICS | | |
|---|---|---|---|
| | Flat | Some Grade | Steep Grade |
| No | 65.7% | 29.2% | 5.1% |
| Yes | 71.1% | 25.2% | 3.7% |
| B.C. Total | 66.1% | 28.9% | 5.0% |

Table 13
Pre-collision Action of Vehicles in Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Casualty Accident | PRE-COLLISION ACTION | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Going straight | Right turn | Left turn | Slow/ Stop | Stopped in Traffic | Avoid Object | Change lanes | Over-taking | Backing | Skidding | Swerving | Other |
| **No Bicycles Involved** | | | | | | | | | | | | |
| MOTOR VEHICLE N=43,839 | 57.7% | 3.0% | 11.5% | 4.8% | 8.9% | 0.4% | 1.4% | 1.0% | 1.0% | 3.7% | 1.4% | 5.2% |
| **Bicycles Involved** | | | | | | | | | | | | |
| MOTOR VEHICLE N=1,978 | 43.5% | 18.9% | 19.2% | 1.7% | 2.2% | 0.3% | 1.2% | 1.6% | 2.1% | 0.4% | 0.5% | 8.5% |
| BICYCLE N=1,919 | 83.0% | 2.6% | 7.2% | 0.3% | 0.5% | 0.5% | 1.6% | 1.2% | 0.0% | 0.2% | 1.5% | 1.5% |

Table 14
Motor Vehicle Manoeuver at Point of Impact in Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Bicycle Accident | VEHICLE MANOEUVER | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Rear End | Head On | Side Swipe | Inter-secting at 90° | Over-taking | Right turn | Left turn | Run off road to right | Run off road to left | Other |
| No | 30.4% | 4.7% | 2.9% | 21.4% | 2.0% | 0.8% | 8.7% | 15.8% | 11.5% | 1.8% |
| Yes | 9.7% | 3.5% | 4.5% | 45.0% | 11.4% | 5.3% | 17.6% | 1.3% | 0.3% | 1.4% |
| B.C. Total | 29.2% | 4.6% | 3.0% | 22.8% | 2.5% | 1.0% | 9.2% | 15.0% | 10.8% | 1.9% |

these accidents were for the most part "going straight" (83.0%), or making a left turn (7.2%).

At point of impact in bicycle/motor vehicle casualty accidents there is a high proportion of 90° collisions (45.0%), as can be seen from Table 14. The next most frequent motor vehicle manoeuver at point of impact in these accidents was "left turn" (17.6%) followed by "overtaking" (11.4%).

## Post-Collision and Contributing Factors:

As one would expect, bicycle/motor vehicle casualty accidents produced more severe damage to the bicycle than to the motor vehicle, and these accidents produced less damage to the motor vehicle than did other sorts of motor vehicle accidents (see Table 15).

Table 16 displays the most frequently cited primary contributing factors to the accident for vehicles involved. The proportions are calculated only on the basis that the vehicle had contributed to the casualty accident, and therefore those vehicles that had contributing factors coded as "does not apply" by the investigating police officers were removed from the calculations. For casualty motor vehicle accidents not involving bicycles, 20% of the vehicles involved were coded as "does not apply", while for motor vehicles involved in bicycle/motor vehicle casualty accidents, 58% were coded "does not apply". Finally, 51% of the bicycles in bicycle/motor vehicle casualty accidents were coded "does not apply". While "does not apply"

Table 15
Damage Severity to Vehicles in Casualty Accidents:
Non-Bicycle vs. Bicycle
British Columbia, 1986.

| Casualty Accident | DAMAGE SEVERITY | | | | |
|---|---|---|---|---|---|
| | No Damage | Light Damage | Moderate Damage | Severe Damage | Demolished |
| **No Bicycles Involved** | | | | | |
| MOTOR VEHICLE N=40,257 | 7.4% | 27.5% | 30.7% | 21.9% | 12.5% |
| **Bicycles Involved** | | | | | |
| MOTOR VEHICLE N=1,586 | 41.6% | 51.2% | 6.7% | 0.5% | 0.0% |
| BICYCLE N=1,250 | 21.4% | 39.8% | 17.2% | 11.6% | 10.0% |

Table 16
Primary Contributing Factors, Vehicles:
Non-Bicycle vs. Bicycle.
British Columbia, 1986.

| Casualty Accident | Alcohol | Cutting in | W/out Due Care | Inexperience | Fail to yield | Improper Passing | Wrong Side of Road | Traffic Signal Ignored | Improper Turning | Unsafe Speed | Defect. Head Light | Visibility Impaired | Backing Unsafely | Defect. Brakes | Tailgate | Weather |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **No Bicycles Involved** | | | | | | | | | | | | | | | | |
| MOTOR VEHICLE N=34,961 | 9.3% | 0.7% | 13.9% | 2.3% | 10.1% | 0.8% | 0.8% | 3.1% | 1.1% | 5.4% | 1.0% | 0.9% | 0.7% | 0.5% | 4.5% | 4.2% |
| **Bicycles Involved** | | | | | | | | | | | | | | | | |
| MOTOR VEHICLE N= 746 | 3.5% | 4.2% | 23.7% | 1.7% | 37.4% | 2.4% | 1.3% | 2.0% | 4.4% | 2.4% | 0.1% | 6.8% | 0.0 | 0.1% | 0.8% | 1.9% |
| BICYCLE N= 868 | 3.7% | 3.9% | 26.2% | 4.4% | 15.3% | 5.4% | 12.0% | 7.9% | 2.6% | 3.3% | 5.8% | 1.8% | 0.0% | 1.8% | 1.0% | 1.5% |

Table 17
Driver/Cyclist Gender, Casualty Motor Vehicle Accidents
British Columbia, 1986

| Casualty Accident | Male | Female |
|---|---|---|
| **No Bicycles Involved** | | |
| MOTOR VEHICLE N=43,775 | 69.3% | 30.7% |
| **Bicycles Involved** | | |
| MOTOR VEHICLE N=1,635 | 66.4% | 33.6% |
| BICYCLE N=1,897 | 73.6% | 26.4% |

does not always imply a lack of fault, from these figures it can be seen that there was an identified contributing factor found for 49% of the cyclists and 42% of the motor vehicle drivers in those bicycle/motor vehicle accidents.

Turning to specific contributing factors, the most frequently cited for motor vehicles in bicycle/motor vehicle casualty accidents were Failure to Yield Right of Way (37.4%), Driving Without Due Care and Attention (23.7%) and Visibility Impaired (6.8%) while for bicycles in these accidents the factors were Driving Without Due Care and Attention (26.2%), Failure to Yield Right of Way (15.3%), Wrong Side of Road (12.0%) and Traffic Sign/Signal Ignored (7.9%).

## PERSONS INVOLVED

### Drivers and Cyclists:

Of the total number of motor vehicle drivers and cyclists involved in casualty motor vehicle accidents in 1986, 7.5% were either drivers or cyclists in bicycle/motor vehicle accidents, and the remainder were in motor vehicle accidents that did not involve bicycles. From Table 17 it can be seen that the proportion of males was highest in the cyclist group (73.6%) and lower but about the same magnitude in both motor vehicle drivers groups (66.4% in bicycle/motor vehicle accidents and 69.3% in other motor vehicle accidents).

The average age for motorists in bicycle/motor vehicle casualty accidents was 37.9 years, while the average age for cyclists in these accidents was 21.6 years. For other types of casualty motor vehicle accidents, the average driver age was 34.4 years.

Cyclist age is broken out by gender and shown in Figure 3. It is interesting to note that, although many people may imagine that cyclists in motor vehicle accidents tend to be young children, 68.4% were over 16 years of age, with about half (52.8%) falling between 16 and 30 years.

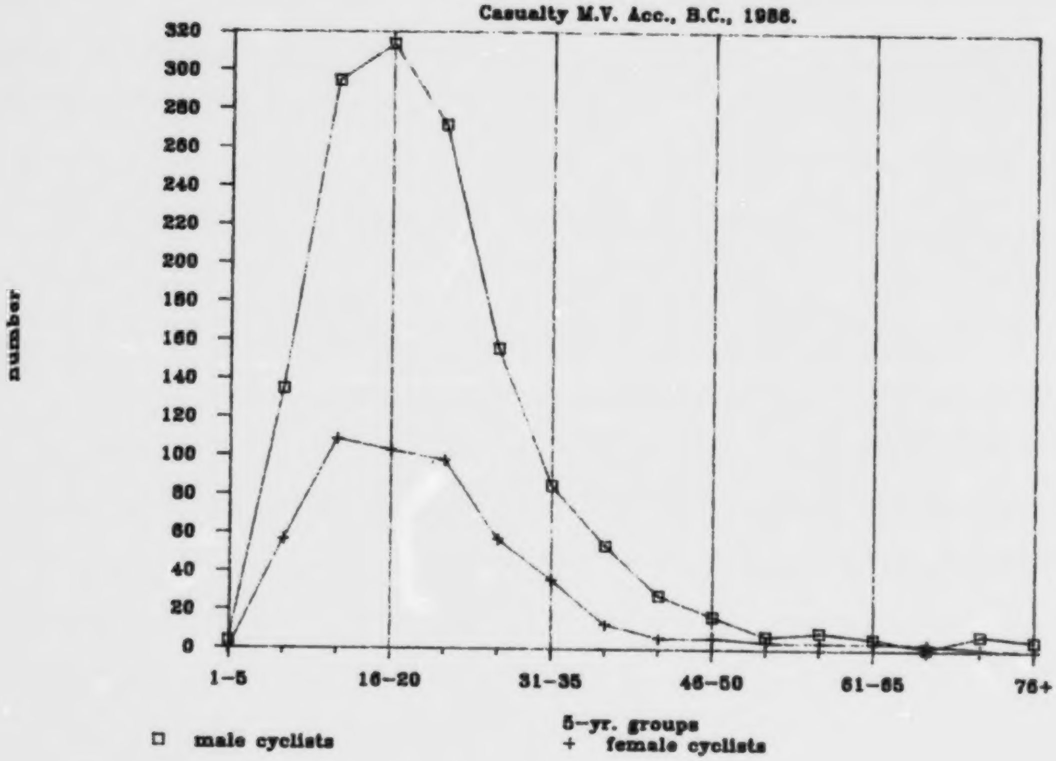
## PERSONS INJURED

There were an average of 1.0 persons injured and 0.01 killed per bicycle/motor vehicle casualty accident in B.C. in 1986, resulting in 2,079 injuries and 17 deaths, while the respective figures for other sorts of casualty motor vehicle accidents were 1.4 injured, 0.02 killed, 38,299 injuries and 582 deaths.

Tables 18 through 20 show injury locations, type and state of consciousness for those involved in casualty accidents, and whether or not they were injured. As one would expect, cyclists were more likely to be injured in bicycle/motor vehicle collisions than were the motorists. Comparing cyclists with motorists in other sorts of motor vehicle collisions, the location of a cyclist's most serious injury appears to be divided among the lower leg area (27.2%), head/neck area (26.5%) and the shoulder/arm area (21.8%), while the most frequently noted area for the most serious injury to a motorist was the head/neck area (28.3%) followed by chest/back (7.6%), as can be seen from Table 18.

It should be noted that these assessments refer to the most serious injury and were determined by the investigating police officer, as opposed to by a physician.

Figure 3



Age & Gender, Bicyclists.

Casualty M.V. Acc., B.C., 1986.

Table 18
Victims' Injury Locations
Non-Bicycle vs.Bicycle Casualty Accidents
British Columbia, 1986

| Casualty Accident | No Injury | Head/ Neck | Chest/ Back | Shoulder/ Arm | Abdomen/ Hip | Lower Leg | All Body |
|---|---|---|---|---|---|---|---|
| No Bicycles Involved | | | | | | | |
| MOTOR VEHICLE N=72,292 | 48.1% | 28.3% | 7.6% | 5.9% | 3.1% | 5.5% | 1.4% |
| | | | | | | | |
| Bicycles Involved | | | | | | | |
| MOTOR VEHICLE N=2,515 | 98.5% | 0.7% | 0.1% | 0.2% | 0.2% | 0.2% | 0.1% |
| BICYCLE N=2,017 | 1.4% | 26.5% | 8.1% | 21.8% | 11.9% | 27.2% | 3.1% |

Table 19
Victims' Injury Type:
Non-Bicycle vs. Bicycle Casualty Accidents.
British Columbia, 1986

| Casualty Accident | INJURY TYPE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | None | Abrasion | Bruise | Laceration | Bleeding | Fracture | Dislocation | Concussion | Whiplash |
| No Bicycles Involved | | | | | | | | | |
| MOTOR VEHICLE N=72,292 | 54.4% | 4.8% | 18.5% | 5.9% | 3.2% | 3.6% | 1.1% | 1.1% | 7.2% |
| Bicycles Involved | | | | | | | | | |
| MOTOR VEHICLE N=2,515 | 98.5% | 0.5% | 0.6% | 0.2% | 0.0% | 0.0% | 0.0% | 0.1% | 0.1% |
| BICYCLE N=2,017 | 8.0% | 24.3% | 34.2% | 11.2% | 6.0% | 10.3% | 2.1% | 2.7% | 1.1% |

Table 20
Victim's State of Consciousness:
Non-Bicycle vs. Bicycle Accidents.
British Columbia, 1986

| Casualty Accident | STATE OF CONSCIOUSNESS | | | | | |
|---|---|---|---|---|---|---|
| | Appears Normal | Agitated | Incoherent | Semi-conscious | Unconscious | Appears Dead |
| No Bicycles Involved | | | | | | |
| MOTOR VEHICLE N=72,292 | 87.8% | 7.9% | 1.0% | 1.9% | 0.5% | 0.8% |
| Bicycles Involved | | | | | | |
| MOTOR VEHICLE N=2,515 | 99.6% | 0.2% | 0.0% | 0.1% | 0.0% | 0.0% |
| BICYCLE N=2,017 | 76.0% | 16.3% | 1.7% | 4.1% | 1.0% | 0.8% |

## CONCLUSIONS

To summarize, between 1980 and 1986 bicycle/motor vehicle casualty-producing accidents comprised about 7% of all casualty traffic accidents in British Columbia, ranging from about 14% to 17% in July-August to about 2% to 4% in December-January. They tended to occur in urban areas, at intersections, in the Spring-to-Fall period, in good weather, on weekdays, and in daylight. In the majority of these accidents there was no traffic control device in place, although in 20% there was a stop sign and in 13% there was a traffic light. About 10% were hit-and-run.

Typically, the casualty accident itself involved both the motor vehicle and the cyclist "going straight" and colliding at 90° at an intersection. The next most frequent accident configuration involved the motor vehicle making a right or left turn and colliding with the cyclist who was "going straight". The third most frequent bicycle/motor vehicle collision occurred when the motor vehicle was passing or "overtaking" the cyclist.

Turning to the primary factors contributing to these accidents (as determined by the investigating police officers), there were no contributing factors assigned to about 50% of the cyclists and about 60% of the motorists. Where contributing factors were indicated, for motorists the most frequent were Failure to Yield the Right of Way (37%), Driving Without Due Care and Attention (24%), and Visibility Impaired (7%) while for cyclists they were Driving Without Due Care and Attention (26%), Failure to Yield Right of Way (15%), and Wrong Side of Road (12%).

Cyclists involved in these bicycle/motor vehicle casualty accidents were three times as likely to be male than female, and had an average age of 22 years, with about 70% being over 16 years of age and half falling between 16 and 30 years. Head injuries or lower leg injuries were the most frequent outcomes for cyclists (27% each), followed by arm/shoulder injuries (22%). Of the 2,096 casualties, 17 or 0.8% were fatalities.

These results suggest two directions for countermeasures that might reduce bicycle/motor vehicle casualty accidents: public education on the legitimacy of cyclists as road users and public education emphasizing improvements in bicycle conspicuity Argument for the latter stems from the fact that for motorists in bicycle/motor vehicle collisions "visibility impaired" and for cyclists "defective headlights" are both contributing factors that could be reduced if the cyclist was more visible. However, it would appear that the larger (although perhaps less soluble) problem has to do with neither cyclists nor motorists recognizing that cyclists have similar rights and responsibilities on the public roads as do any other road users.

In more detail, for motorists in these accidents, Driving Without Due Care and Attention (24%) and Failure to Yield Right of Way (37%) suggest that the driver is not treating the bicycle in the same way that another motor vehicle would be treated. For cyclists, the contributing factors of Due Care (26%), Failure to Yield (15%), Wrong Side of Road (12%) and Signal Ignored (8%)

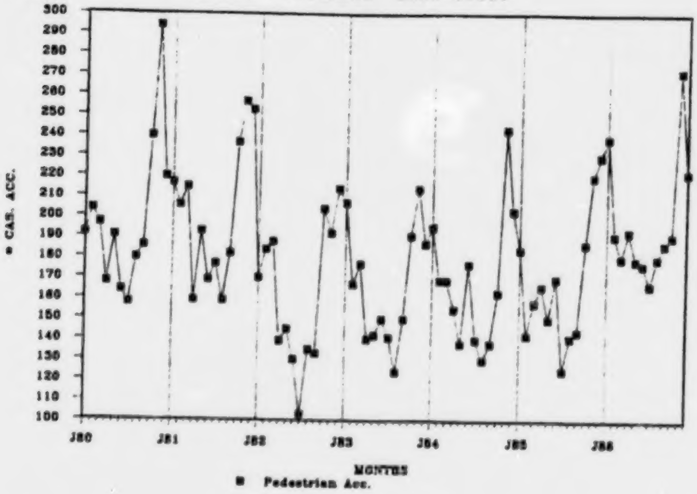
suggest that they are not riding the bicycle with the same respect for other road users or for the laws that they would have if they were driving a motor vehicle. Indeed, the fact that about 70% of these cyclists are 16 years of age or older and probably have drivers' licences, opens up possible driver licence-related as well as public education responses to this situation.

Finally, with the increasing costs of owning and operating a motor vehicle and with the increasing emphasis on fitness and "lifestyle" (e.g. triathlons), one would not expect these casualty traffic accidents to decrease in the future.

# Pedestrian/Motor Vehicle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

## SUMMARY

Figure 1. Number of Pedestrian Casualty Traffic Accidents. British Columbia 1980-1986.



Pedestrian casualty traffic accidents comprise about 8% of all casualty traffic accidents, and were at their lowest frequency in Summer and highest in the Fall and early Winter. About half of these accidents occurred at intersections and half between intersections.

Regarding intersection pedestrian/motor vehicle casualty accidents, they tended to be urban, daylight phenomena, with 39% having occurred where there was no traffic control device, 20% where there was a stop sign and 38% where there was a stop light (of those, 66% on a green light, 26% on red, 8% on amber). A relatively high proportion (13.4%) were hit-and-run.

Where these intersection-related pedestrian accidents were classified as "motorist fault", the most common pattern was for the pedestrian to be struck by a vehicle proceeding straight through the intersection (65%), and the second most common pattern involved being struck by a vehicle making a left turn (19%). "Failure to yield right of way" (43.7%), "driving without due care" (23.9%), "weather" (7.1%) and "impaired visibility" (7.1%) were the most frequently cited contributing factors to these motorist-fault pedestrian/motor vehicle intersection casualty accidents. This type of accident comprised 38.6% of all pedestrian accidents in 1986.

Where the intersection-related pedestrian casualty traffic accident was classified as "pedestrian fault" the typical pattern involved the vehicle striking the pedestrian as he/she was crossing the road (77%), with 36% crossing against a signal, 29% crossing with no signal or crosswalk, and 19% crossing at a crosswalk. For the pedestrians, the most commonly cited contributing factors (after "pedestrian error" at 69.2%) were "alcohol" (19.7%), "ignoring traffic control device" (13.8%), and "failure to yield right of way" (14.2%). These accidents comprised 11.4% of all pedestrian/motor vehicle casualty accidents in 1986.

Turning to non-intersection pedestrian casualty traffic accidents, these tended more than their intersection-related counterparts to be less urban, and more associated with darkness and bad weather, although the majority of each type occurred in daylight and in good weather. A similarly high proportion (13.6%) were hit-and-run.

Where these non-intersection pedestrian casualty traffic accidents were classified as "motorist fault", typically the vehicle was "going straight" (68%) or "backing up" (13%) and the pedestrian was "crossing with no signal or crosswalk" (23%), "emerging from behind a vehicle" (16%), or "walking with traffic" (15%). In 29% of these accidents the pedestrian was struck "at 90°" to the vehicle, 16% "head-on" and 13% "side-swiped", while the three most commonly cited contributing factors assigned to the motorist were "driving without due care" (21%), "backing unsafely" (9.7%) and "alcohol" (8.4%). These accidents comprised 28.2% of all pedestrian casualty accidents in 1986.

Where non-intersection pedestrian casualty accidents were classified as "pedestrian fault", typically the vehicle was "going straight" (82%) and the pedestrian was "crossing with no signal or crosswalk" (39%) or "emerging from behind vehicle" (29%), resulting in collisions "at 90°" to the vehicle (54%) or "head-on" (18%). After "pedestrian error" (75.9%), the most commonly cited contributing factor for pedestrians was "alcohol" (24.8%), with no other factor exceeding 3% each. These accidents comprised 21.8% of all pedestrian casualty traffic accidents in 1986.

Turning to the age and gender of pedestrians and drivers in pedestrian/motor vehicle casualty accidents, for both groups there was a higher proportion of males than females in the "at fault" classifications, and the average age of drivers and pedestrians was about the same (34.9 yrs. vs. 33.6 yrs.). On the other hand, while the average ages of male and female drivers was about the same in both intersection and non-intersection "at fault" and "not at fault" classifications, for pedestrians, those in non-intersection accidents averaged about 3 years younger than those in intersection accidents (33.6 yrs. vs. 37.4 yrs.).

Overall, in 1986 there were 2,141 pedestrians injured and 88 killed, with 4% of those casualty accidents producing fatalities. A high proportion of the injuries were to the lower portion of the body.

Arguably, the public's perception of pedestrian traffic accidents is formed by the high-visibility, human-interest stories carried in the news media, and this perception probably includes the impression that these accidents involve children darting out from behind parked cars to be struck down by drinking drivers and/or the impression of innocent pedestrians being hit by motorists who run stop lights. However, as these results show, half of the pedestrian casualty traffic accidents did not occur at intersections, only 19% occurred at controlled intersections, the average age of injured pedestrians was about 34 years, the most common contributing factor for the pedestrian (but not the driver) was alcohol, and about 30% could be classified as the pedestrian's fault.

From the perspective of developing countermeasures to these accidents, programs should target both motorists and pedestrians and should distinguish between intersection and non-intersection accidents. Finally, the significant peak in the frequency of these accidents at the October/November period (just at the change from daylight savings time to standard time with the concommitant increase in darkness during the high-pedestrian volume evening rush hours) ought to be singled out for intensive public awareness campaigns.

# Pedestrian/Motor Vehicle Casualty Traffic Accidents: Trends, Characteristics, Persons Involved and Consequences. British Columbia, 1986.

"Witnesses tell about killer car"
(Vancouver Province, Nov. 3, 1987)

"Drunk driving suspect car plowed through softball crowd"
(Vancouver Sun, Nov. 7, 1986)

"Crushed pedestrian city's 28th road death"
(Vancouver Sun, Nov. 2, 1985)

Every year in British Columbia about 2,000 pedestrians are injured or killed in traffic accidents, and these accidents comprise over 20% of all casualty traffic accidents in some urban areas (Mercer, 1985 a,b). The more sensational of these accidents are reported in the media (see above) and perhaps because of the inequality of any conflict between a motor vehicle and a pedestrian, are often portrayed as entirely the fault of the motorist. However, this portrayal of the pedestrian as an innocent victim and the driver as morally corrupt makes the accident seem almost inevitable, and makes attempts to produce accident countermeasures seem futile.

On the other hand, if pedestrian casualty traffic accidents were examined in terms of dimensions such as circumstances, fault, driver and pedestrian characteristics and so on and they fell into a number different patterns, then accident countermeasures might be developed to address some of these patterns. Consequently, it is the purpose of this paper to examine pedestrian traffic accidents that resulted in injury or death in order to both characterize them and to recommend directions that might be taken to reduce these accidents.

## METHOD

In order to examine trends in pedestrian/motor vehicle casualty accidents (ie. an accident where one or more persons were injured or killed), police Traffic Accident Reports (MV104) were examined from 1980 to 1986, while a detailed analysis of those accidents was drawn from the 1986 MV104 casualty accident reports. As the raw data from these police reports are managed by the Motor Vehicle Department of the Ministry of Transportation and Highways, and as that Department is constantly improving their data base, any statistics produced by that Department that contradict those reported herein ought to be considered as the more accurate.

## RESULTS

It has been shown that, while intersection and non-intersection casualty traffic accidents involved about the same number of pedestrians, these two accident locations have very different accident profiles (Mercer, 1987a). Further, if target groups for traffic accident countermeasures are to be identified, it could be useful to consider pedestrian casualty accidents in terms of whether the pedestrian or motorist was at fault in the accident. Consequently, the analyses of these pedestrian casualty accidents compare those that occurred at intersections with those that did not, and, with regard to the immediate circumstances of the accident, compare those where the pedestrian was at fault with those where the motorist was at fault.

In all, 49% of the pedestrian casualty accidents in 1986 occurred at intersections, and 29% of the pedestrian casualty accidents in 1986 were to some extent the fault of the pedestrian (how fault was determined is explained below).

### Trends and Patterns:

From Table 1 it can be seen that pedestrian casualty traffic accidents comprised about 8% of all casualty traffic accidents between 1980 and 1986, with no apparent increasing or decreasing trend. Figures 1 through 3 show that these accidents, unlike the remainder of the casualty traffic accidents, tend to peak in the Fall and early Winter and are at their lowest in the summer months. Interestingly, the consistently highest period for these accidents exactly coincides with the change from daylight savings to standard time.

Figure 1. Number of Pedestrian Casualty Traffic Accidents. British Columbia 1980-1986.

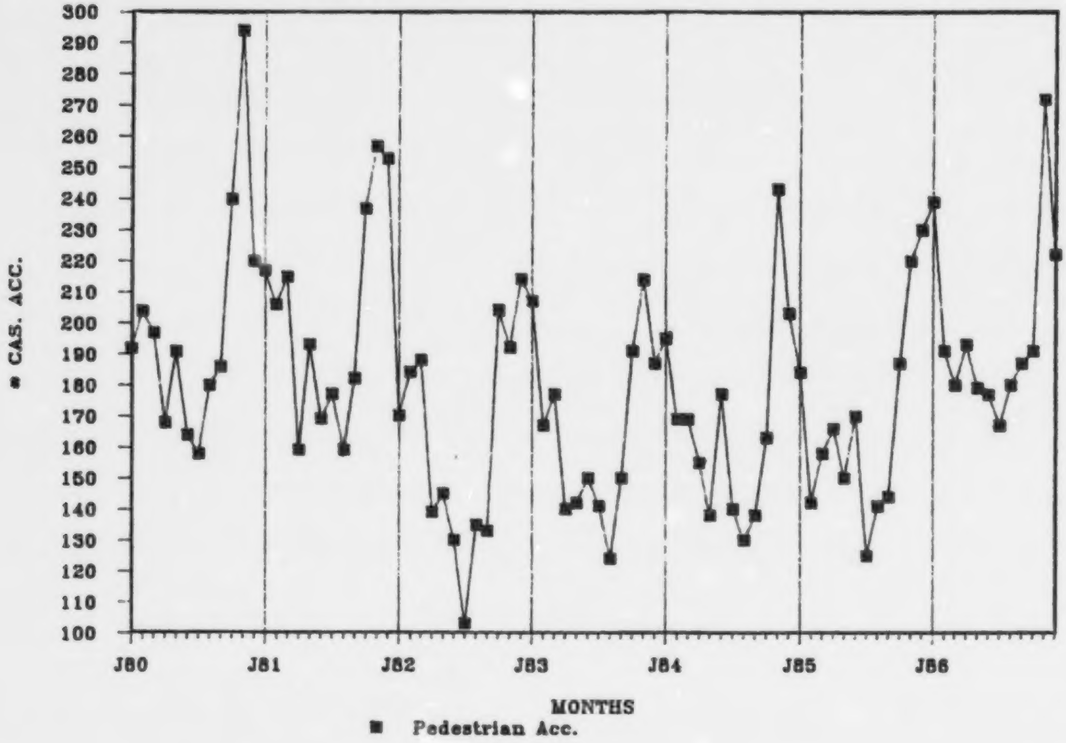


Table 1
Pedestrian Casualty Accidents
British Columbia, 1986.

| Year | # Pedestrian Accidents | % of Total Accidents |
|---|---|---|
| 1980 | 2,394 | 8.2% |
| 1981 | 2,424 | 7.7% |
| 1982 | 1,937 | 8.0% |
| 1983 | 1,990 | 8.6% |
| 1984 | 2,020 | 8.6% |
| 1985 | 2,017 | 8.0% |
| 1986 | 2,378 | 8.2% |

Figure 2. % Casualty Traffic Accidents Involving Pedestrians. British Columbia, 1980-1986.

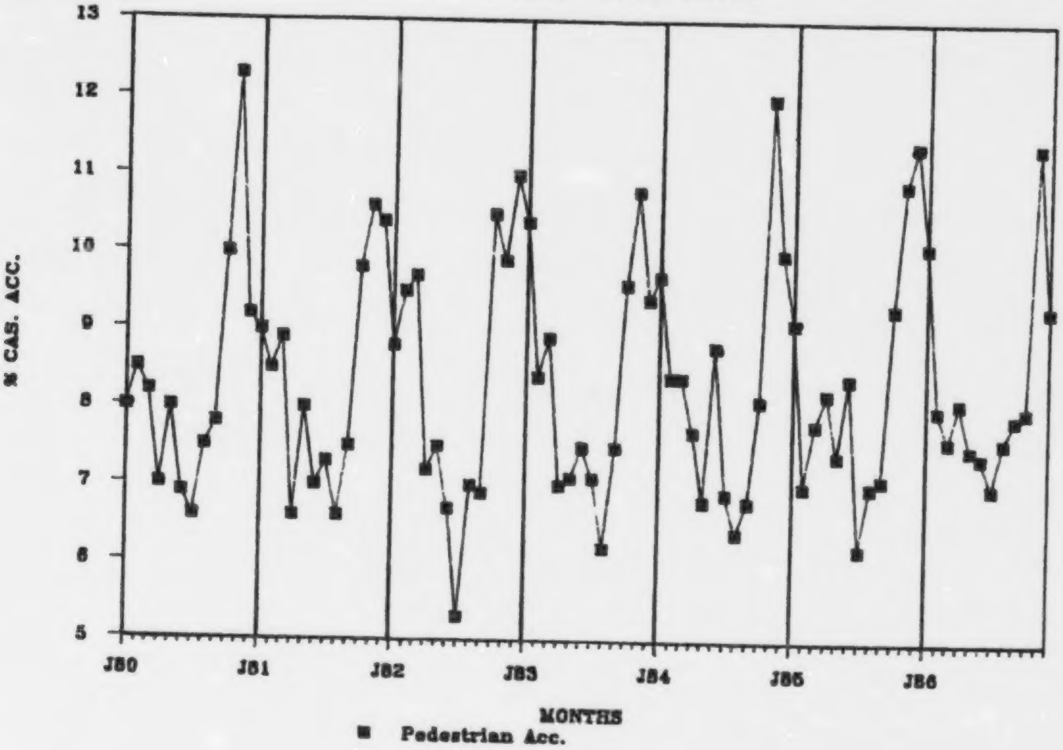
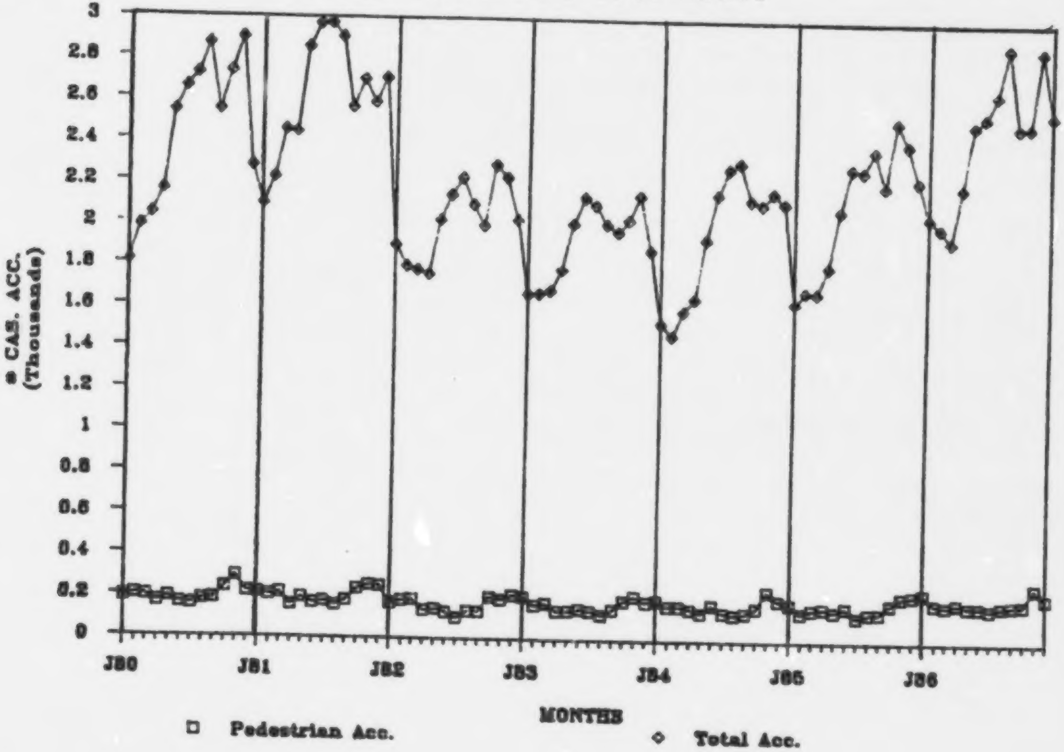


Figure 3. Total and Number of Pedestrian Casualty Traffic Acc. British Columbia, 1980-1986.



## CASUALTY ACCIDENT CHARACTERISTICS:

### Time, Location and Conditions:

Table 2 shows that a higher proportion of non-intersection pedestrian casualty accidents occurred on the weekends, while a higher proportion of intersection pedestrian casualty accidents occurred on weekdays. Regarding time of day, a higher proportion of non-intersection than intersection pedestrian accidents occurred at night (Table 3), and this fact is reflected in the higher proportion of non-intersection than intersection accidents that occurred in the dark (Table 4). On the other hand, the majority of both intersection and non-intersection pedestrian casualty accidents occurred in daylight (57%).

As would be expected, Table 5 shows that intersection pedestrian accidents tended to be more of a municipal and urban phenomenon than did non-intersection pedestrian accidents, and that fact is reflected in the accident site land use figures in Table 6.

Considering the presence of a traffic control device in the accident area, as would be expected, in the majority of non-intersection pedestrian accidents there was none (94%). On the other hand, for intersection pedestrian accidents, 39% occurred at intersections with no traffic control device, 20% where there was a stop sign, and 38% where there was a stop light. Of those that occurred where there was a stop light, 66% occurred on a green light, 26% on a red light and 8% on an amber light.

Table 2
Day of Week of Pedestrian Casualty Accidents:
Intersection vs. Non-intersection
British Columbia, 1986.

| Pedestrian Accident | DAY OF WEEK | | | | | | |
|---|---|---|---|---|---|---|---|
| | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
| Intersection | 12.5% | 15.1% | 17.2% | 17.1% | 18.2% | 12.9% | 7.0% |
| Non-intersection | 11.3% | 12.0% | 17.1% | 13.6% | 18.0% | 18.3% | 9.6% |
| | | | | | | | |
| B.C. Total | 11.4% | 13.5% | 17.2% | 15.3% | 18.1% | 15.7% | 8.3% |

Table 3
Time of day of Pedestrian Casualty Accidents:
Intersection vs. Non-intersection
British Columbia, 1986.

| Pedestrian Accident | TIME OF DAY (two hour intervals) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Midnight 2:00 AM | 2:00 AM 4:00 AM | 4:00 AM 6:00 AM | 6:00 AM 8:00 AM | 8:00 AM 10:00 AM | 10:00 AM NOON | NOON 2:00PM | 2:00 PM 4:00 PM | 4:00 PM 6:00 PM | 6:00 PM 8:00 PM | 8:00 PM 10:00 PM | 10:00 PM Midnight |
| Intersection | 2.7% | 1.8% | 0.5% | 3.4% | 6.8% | 7.9% | 9.7% | 15.9% | 21.3% | 15.8% | 8.0% | 6.3% |
| Non-intersection | 5.0% | 4.6% | 1.6% | 2.8% | 5.1% | 8.1% | 10.2% | 17.1% | 16.7% | 9.3% | 11.2% | 8.3% |
| | | | | | | | | | | | | |
| B.C. Total | 3.9% | 3.2% | 1.1% | 3.1% | 5.9% | 8.0% | 10.0% | 16.5% | 19.0% | 12.5% | 9.6% | 7.3% |

Table 4
Light Conditions During Pedestrian Casualty Accidents:
Intersection vs. Non-intersection
British Columbia, 1986.

| Pedestrian Accident | LIGHT CONDITION | | | | | |
|---|---|---|---|---|---|---|
| | Day-Light | Dawn | Dusk | Night/Full Illumination | Night/Some Illumination | Night/No Illumination |
| Intersection | 57.4% | 0.8% | 3.3% | 17.0% | 19.4% | 2.0% |
| Non-intersection | 57.5% | 0.9% | 3.6% | 10.2% | 19.5% | 8.3% |
| | | | | | | |
| B.C. Total | 57.5% | 0.9% | 3.5% | 13.5% | 19.5% | 5.2% |

Table 5
Percentage of Pedestrian Accidents by Police Subdivision
British Columbia, 1986.

| LOCATION | Total # of Pedestrian Accidents | % Intersection Accidents | % Non-Intersection Accidents |
|---|---|---|---|
| Courtenay Municipal | 49 | 46.9% | 53.1% |
| Courtenay Rural | 20 | 30.0% | 70.0% |
| Kamloops Municipal | 60 | 50.0% | 50.0% |
| Kamloops Rural | 18 | 22.2% | 77.8% |
| Kelowna Municipal | 72 | 44.4% | 55.6% |
| Kelowna Rural | 31 | 38.7% | 61.3% |
| Nelson Municipal | 7 | 42.9% | 57.1% |
| Nelson Rural | 19 | 26.3% | 73.7% |
| Prince George Municipal | 70 | 38.6% | 61.4% |
| Prince George Rural | 28 | 14.3% | 85.7% |
| Prince Rupert Municipal | 27 | 33.3% | 66.7% |
| Prince Rupert Rural | 15 | 26.7% | 73.3% |
| Victoria Municipal | 48 | 45.8% | 54.2% |
| Victoria Rural | 40 | 32.5% | 67.5% |
| R.C.M.P. District 1 | | | |
| Municipal | 580 | 45.9% | 54.1% |
| Rural | 29 | 27.6% | 72.4% |
| R.C.M.P. Freeway Patrol | 7 | 14.3% | 85.7% |
| Nelson Area Independents | 3 | 66.7% | 33.3% |
| Vancouver Area Independents | 831 | 57.9% | 42.1% |
| Victoria Area Independents | 143 | 53.1% | 46.9% |
| Other Police | 2 | 0.0% | 100.0% |
| British Columbia Total | 2,099 | 49.0% | 51.0% |

Table 6
Land Use at Pedestrian Casualty Accidents:
Intersection vs. Non-Intersection
British Columbia 1986.

| Pedestrian Accident | LAND USE | | | | | | |
|---|---|---|---|---|---|---|---|
| | School/ Playgrnd | Family Res. | Apartment | Business/ Shopping | Industrial | Agricultural | Recreation Camp/Park |
| Intersection | 3.7% | 23.3% | 7.7% | 61.1% | 2.4% | 0.4% | 1.4% |
| Non-Intersection | 6.1% | 29.8% | 9.7% | 43.2% | 3.8% | 4.7% | 2.7% |
| B.C. Total | 4.9% | 26.7% | 8.7% | 51.9% | 3.1% | 2.6% | 2.1% |

Table 7 shows that a higher proportion of non-intersection than intersection pedestrian accidents occurred in bad weather, although the majority of each type occurred in clear or cloudy weather, and these conditions are reflected in the road surface conditions described in Table 8.

Tables 9 and 10 show that for both locations of pedestrian accidents the road was primarily straight and flat.

Finally, in line with the urban and municipal vs. rural distinction noted above, 94% of the intersection and 86% of the non-intersection pedestrian accidents occurred in areas with a posted speed zone of 50 Kmh or less.

Vehicles:

Regarding intersection pedestrian casualty accidents, 80% involved passenger cars, 2% commercial vehicles (e.g. bus, truck, taxi), 1% motorcycles and 2% out-of-province registered vehicles, while non-intersection pedestrian accidents involved a lower proportion of passenger vehicles (73%), a higher proportion of commercial vehicles (4%), a higher proportion of motorcycles (2%) and a higher proportion of out-of-province registered vehicles (4%). Finally, 13.4% of intersection and 13.6% of non-intersection pedestrian casualty accidents were hit-and-run.

Pre-collision Events, Collision Events, and Contributing Factors:

As noted above, in order to develop pedestrian accident countermeasures, it is useful to distinguish between those that are primarily the responsibility or fault of the pedestrian and those that are primarily the responsibility or fault of the motorist. For the purposes of these analyses, an accident was

### Table 7
### Weather Conditions During Pedestrian Casualty Accidents: Intersection vs. Non-intersection British Columbia, 1986.

| Pedestrian Accident | WEATHER CONDITION | | | | |
|---|---|---|---|---|---|
| | Clear | Cloudy | Raining | Snow/ Sleet | Other |
| Intersection | 44.0% | 26.1% | 28.1% | 1.2% | 0.6% |
| Non-intersection | 54.1% | 29.4% | 14.7% | 0.9% | 0.9% |
| B.C. Total | 49.1% | 27.8% | 21.3% | 1.1% | 0.7% |

### Table 8
### Road Surface Characteristics at Pedestrian Casualty Accidents: Intersection vs. Non-intersection British Columbia, 1986.

| Pedestrian Accident | ROAD SURFACE CONDITION | | | | | |
|---|---|---|---|---|---|---|
| | Dry | Wet | Muddy | Snow | Slush | Ice |
| Intersection | 58.2% | 40.0% | 0.1% | 0.6% | 0.1% | 1.0% |
| Non-intersection | 71.1% | 25.4% | 0.3% | 1.4% | 0.2% | 1.7% |
| B.C. Total | 64.8% | 32.5% | 0.2% | 1.0% | 0.1% | 1.3% |

### Table 9
### Horizontal Road Surface Characteristics at Pedestrian Casualty Accidents: Intersection vs. Non-intersection British Columbia, 1986.

| Pedestrian Accident | HORIZONTAL ROAD CHARACTERISTICS | | | |
|---|---|---|---|---|
| | Straight | Curve | Sharp Curve | Winding Curves |
| Intersection | 96.0% | 3.6% | 0.4% | 0.0% |
| Non-intersection | 94.1% | 4.9% | 0.6% | 0.4% |
| B.C. Total | 95.0% | 4.3% | 0.5% | 0.2% |

### Table 10
### Vertical Road Surface Characteristics at Pedestrian Casualty Accidents: Intersection vs. Non-intersection British Columbia, 1986.

| Pedestrian Accident | VERTICAL ROAD CHARACTERISTICS | | |
|---|---|---|---|
| | Flat | Some Grade | Steep Grade |
| Intersection | 78.1% | 20.3% | 1.6% |
| Non-intersection | 73.4% | 23.0% | 3.5% |
| B.C. Total | 75.7% | 21.7% | 2.6% |

categorized as being at least in part attributable to the pedestrian if one of the contributing factors to the accident identified by the investigating police was "pedestrian error", or if there were any contributing factors associated with the pedestrian. Those accidents where contributing factors were only associated with the motorist and none of the contributing factors to the accident was "pedestrian error" were classified as being due to the motorist alone. Using this operational definition, 71% of these casualty pedestrian traffic accidents were entirely the motorist's fault and 29% were to some extent the fault of the pedestrian. Further, at intersections 23% were classified as "pedestrian fault" while 43% of the non-intersection accidents were so classified - an increase of 87%.

Tables 11 through 14 examine these pedestrian casualty accidents in terms of both their location (i.e. intersection vs. non-intersection) and whether or not the pedestrian was to any extent at fault in terms of: pre-collision vehicle action, pedestrian action, vehicle manoeuver at point of impact, and contributing factors to the accident. It should be noted that, as both the vehicle and pedestrian can have as many as three contributing factors assigned to each by the investigating officers, these reported proportions can sum to more than 100%.

Intersection, Motorist Fault: In intersection pedestrian casualty accidents where contributing factors were assigned only to the motorist, the three most common vehicle pre-collision actions were "going straight" (47%), "left turn" (25%) and "right turn" (20%), while the three most common actions for pedestrians

Table 11
Pre-collision Action of Vehicles in Pedestrian Casualty Accidents:
British Columbia, 1986.

| Casualty Accident | PRE-COLLISION ACTION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Going straight | Right turn | Left turn | Start in traffic | Slowing/ Stopping | Backing | Skidding | Swerving | Other |
| INTERSECTION | | | | | | | | | |
| Motorist fault N=796 | 47% | 20% | 25% | 1% | 1% | 2% | 2% | 0% | 2% |
| Pedestrian fault N=211 | 70% | 8% | 13% | 2% | 1% | 0% | 2% | 1% | 3% |
| | | | | | | | | | |
| NON-INTERSECTION | | | | | | | | | |
| Motorist fault N=606 | 68% | 3% | 4% | 1% | 2% | 13% | 3% | 2% | 4% |
| Pedestrian fault N=412 | 82% | 1% | 2% | 1% | 4% | 4% | 2% | 1% | 3% |

Table 12
Pedestrian Action in Pedestrian Casualty Accidents:
British Columbia, 1986.

| Casualty Accident | PEDESTRIAN ACTION | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Cross with signal | Cross against signal | Cross at Xwalk | Crossing no signal/ no Xwalk | Walk with traffic | Walk against traffic | Emerge from behind vehicle | Getting in or out of vehicle | Working in road | Playing in road | On side walk | Other |
| INTERSECTION Motorist fault N=685 | 37% | 4% | 30% | 22% | 1% | 1% | 1% | 0% | 0% | 1% | 3% | 0% |
| Pedestrian fault N=183 | 9% | 36% | 19% | 29% | 2% | 0% | 3% | 1% | 0% | 2% | 0% | 0% |
| | | | | | | | | | | | | |
| NON-INTERSECTION Motorist fault N=403 | 0% | 1% | 7% | 23% | 15% | 10% | 16% | 6% | 3% | 8% | 8% | 3% |
| Pedestrian fault N=279 | 0% | 1% | 5% | 39% | 9% | 3% | 29% | 2% | 0% | 8% | 1% | 3% |

Table 13
Vehicle Manoeuver at Point of Impact in Pedestrian Casualty Accidents:
British Columbia, 1986.

| Casualty Accident | VEHICLE MANOEUVER | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rear End | Head On | Side Swipe | Inter-sect 90° | Over taking | Right turn | Left turn | Run off to right | Run off to left | Parking | Other |
| INTERSECTION<br>Motorist fault<br>N=339 | 2% | 4% | 1% | 65% | 1% | 5% | 19% | 1% | 1% | 2% | 0% |
| Pedestrian fault<br>N=100 | 0% | 5% | 1% | 77% | 0% | 3% | 12% | 0% | 1% | 0% | 1% |
| NON-INTERSECTION<br>Motorist fault<br>N=180 | 7% | 16% | 13% | 29% | 1% | 1% | 5% | 7% | 4% | 13% | 4% |
| Pedestrian fault<br>N=82 | 4% | 18% | 7% | 54% | 4% | 0% | 1% | 4% | 1% | 6% | 1% |

Table 14a
Contributing Factors to Pedestrian Casualty Accidents:
British Columbia, 1986.

| Casualty Accident | | CONTRIBUTING FACTORS | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alco-hol | w/out Due Care | Not Yield | Wrong side | Pedes-trian error | Suicide | Ignore traffic control | Visi-bility impaired | Weather | Back unsafe | Driver less | Phys. disab./illness | Speed | Inexp | Improp. pass | Improp. turn | Glare | Veh. fault |
| INTERSECTION<br>Motorist fault<br>N=737 | Motorist related | 3.5% | 23.9% | 43.7% | 0.3% | 0.0% | 0.0% | 4.3% | 7.1% | 7.1% | 1.6% | 0.1% | 0.0% | 3.5% | 2.2% | 1.4% | 2.6% | 3.9% | 1.1% |
| Pedestrian fault<br>N=218 | Motorist related | 1.4% | 8.7% | 14.2% | 0.0% | 0.0% | 0.0% | 2.3% | 9.6% | 11.9% | 0.0% | 0.0% | 0.0% | 2.8% | 1.8% | 0.5% | 0.5% | 1.8% | 0.0% |
| | Pedestrian related | 19.7% | 1.4% | 13.3% | 0.5% | 61.9% | 1.0% | 13.8% | 4.1% | 4.6% | 0.0% | 0.0% | 0.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| NON-INTERSECTION<br>Motorist fault<br>N=538 | Motorist related | 8.4% | 21.0% | 4.5% | 1.1% | 0.0% | 0.0% | 0.2% | 4.8% | 5.2% | 9.7% | 3.0% | 0.2% | 5.2% | 3.7% | 1.0% | 0.7% | 1.4% | 0.0% |
| Pedestrian fault<br>N=416 | Motorist related | 5.3% | 5.0% | 1.0% | 0.0% | 0.0% | 0.0% | 0.0% | 4.1% | 6.0% | 2.4% | 0.2% | 0.2% | 0.0% | 1.4% | 0.0% | 0.2% | 1.0% | 0.2% |
| | Pedestrian related | 24.8% | 1.2% | 0.0% | 0.0% | 75.9% | 1.2% | 1.0% | 0.7% | 2.2% | 0.5% | 0.0% | 1.2% | 0.2% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |

were "crossing with signal" (37%), "crossing at crosswalk" (30%) and "crossing with no signal or crosswalk" (22%). In most instances the pedestrian was struck "at 90°" to the vehicle (65%), followed by being struck from the vehicle making a left turn (19%), followed by being struck from the vehicle making a right turn (5%). The most commonly cited contributing factors to these accidents assigned to the motorist were "failure to yield right of way" (43.7%), "driving without due care" (23.9%) and "weather" and "impaired visibility", each at 7.1%.

This type of accident comprised 38.6% of all pedestrian casualty accidents in 1986.

Intersection, Pedestrian Fault: Intersection casualty accidents where the pedestrian had been assigned a contributing factor differed in a number of different ways from those where the motorist was entirely at fault. Regarding the vehicle pre-collision action as shown in Table 11, a higher proportion of pedestrian fault accidents involved the vehicles "going straight" (70% *vs*. 47%) and a lower proportion involved "left turns" (13% *vs*. 25%) and "right turns" (8% *vs*. 20%). Pedestrian action in these pedestrian-fault intersection accidents showed a much higher proportion of "cross against signal" than did the motorist-fault pedestrian intersection accidents (36% *vs*. 4%), a higher proportion of "cross with no signal or crosswalk" (29% *vs*. 22%) and a lower proportion of "cross at crosswalk" (19% *vs*. 30%).

The three most common point-of-impact conditions for these accidents were "intersect at 90°" (77%), being struck from the vehicle making a left turn (12%) and being struck head on (5%).

Considering contributing factors, all pedestrian-fault accidents were operationally defined as accidents where "pedestrian error" or a pedestrian-associated contributing factor was assigned to the accident, and therefore there could also be contributing factors assigned to the motorist. Regarding the pedestrian-associated pedestrian-fault intersection accident factors found in Table 14a, clearly "pedestrian error" was the most frequent at 69.2%. However, other than to assign fault, that category is not a specific causal factor, and the three most frequently cited factors after that for pedestrians in these accidents were "alcohol" (19.7%), "ignoring traffic control device" (13.8%) and "failure to yield right of way" (13.3%). For motorists in pedestrian-fault intersection casualty accidents, the three most commonly cited factors were "failure to yield right of way" (14.2%), "weather" (11.9%) and "visibility impaired" (9.6%).

In all, pedestrian-fault intersection casualty accidents comprised 11.4% of all pedestrian casualty accidents in 1986.

Non-intersection, Motorist Fault: From Table 11 it can be seen that the three most common vehicle pre-collision actions in motorist-fault pedestrian casualty accidents were "going straight" (68%), "backing" (13%) and "left turn" (4%), while the three most common pedestrian actions in these accidents were "cross with no signal or crosswalk" (23%), "emerge from behind vehicle" (16%) and "walking with traffic" (15%), as shown in Table 12.

At point-of-impact, 29% of non-intersection motorist-fault pedestrian casualty accidents involved a "collision at 90°" to the vehicle, 16% "head-on", and 13% "side-swipe". The three most frequently cited contributing factors were "driving without due care" (21%), "backing unsafely" (9.7%) and "alcohol" (8.4%).

Motorist-fault, non-intersection pedestrian casualty accidents comprised 28.2% of all pedestrian casualty accidents in 1986.

Non-intersection, Pedestrian Fault: The most frequent pre-collision vehicle action in non-intersection pedestrian-fault casualty accidents was "going straight" (82%), with no other single pre-collision action exceeding 4%. The most common pedestrian action in these accidents was "crossing with no signal or crosswalk" (39%), followed by "emerging from behind vehicle" (29%) and "playing in road" (8%). At point-of-impact, 54% of the collisions were "at 90°", 18% "head-on", and 7% "side swipe".

While "pedestrian error" was the most frequently cited contributing factor for pedestrian-fault non-intersection casualty accidents (75.9%), a more specific and next most frequently cited pedestrian-related factor was "alcohol" (24.8%). None of the remaining pedestrian-related contributing factors exceeded 3% each. For motorists in these accidents, the three most frequently cited factors were "weather" (6.0%), "alcohol" (5.3%) and "driving without due care" (5.0%).

Pedestrian-fault non-intersection casualty accidents comprised 21.8% of all pedestrian casualty traffic accidents in 1986.

Motorist Fault vs. Pedestrian Fault Contributing Factors: Table 14b groups the contributing factors to pedestrian casualty traffic accidents by pedestrian fault, motorist fault, and overall proportions. For motorists in motorist-fault pedestrian accidents, the most frequently cited contributing factors involved "failure to yield right of way" (27.1%), "driving without due care" (22.7%) and the environment-related factors of "weather" (6.3%) and "impaired visibility" (6.1%).

For motorists in pedestrian-fault casualty traffic accidents "weather" (8.0%), "impaired visibility" (6.0%) and "without due care" (6.3%) were also frequently cited, in addition to "ignore traffic control device" (7.9%). However, excluding "pedestrian error" (73.7%), and unlike motorist-fault pedestrian casualty-accidents, the most frequently cited contributing factor to pedestrian-fault traffic accidents was "alcohol" associated with the pedestrian (23.0%) (see also Mercer, 1987b). Other pedestrian-related factors were "failure to yield right of way" (11.7%) and "ignore traffic control device" (5.4%), while other factors did not singly exceed 3%.

Overall, frequently cited pedestrian casualty accident contributing factors include "failure to yield right of way" (24.8%) for both motorists and pedestrians; "pedestrian error" (24.5%) for pedestrians only; "without due care" (17.7%) for motorists; one or more of "weather", "impaired visibility" and/or "glare" (7.9% + 6.6% + 2.4% = 16.9%), primarily for motorists; and "alcohol" (12.7%), primarily for the pedestrians.

### Table 14b
### Contributing Factors to Pedestrian Casualty Accidents: British Columbia, 1986.

| Casualty Accident | | CONTRIBUTING FACTORS | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Alcohol | w/out Due Care | Not Yield | Wrong side | Pedestrian error | Suicide | Ignore traffic control | Visibility impaired | Weather | Back unsafe | Driver less | Phys. disab./ illness | Speed | Inexp | Improp. pass | Improp. turn | Glare | Veh. fault |
| MOTORIST FAULT<br>N=1,275 | Motorist related | 5.6% | 22.7% | 27.1% | 0.6% | 0.0% | 0.0% | 2.6% | 6.1% | 6.3% | 5.0% | 1.3% | 0.0% | 4.2% | 2.8% | 1.2% | 1.8% | 2.9% | 1.6% |
| PEDESTRIAN FAULT<br>N=634 | Motorist related | 3.9% | 6.3% | 5.5% | 0.0% | 0.0% | 0.0% | 7.9% | 6.0% | 8.0% | 1.6% | 0.2% | 0.2% | 1.9% | 1.6% | 0.2% | 0.8% | 1.3% | 0.2% |
| | Pedestrian related | 23.0% | 1.3% | 11.7% | 0.2% | 73.7% | 1.1% | 5.4% | 1.7% | 3.0% | 0.0% | 0.0% | 0.9% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| ALL<br>N=1,909 | | 12.7% | 17.7% | 24.8% | 0.5% | 24.5% | 0.4% | 3.8% | 6.6% | 7.9% | 4.0% | 0.9% | 0.4% | 3.5% | 2.4% | 0.8% | 1.5% | 2.4% | 1.1% |

### Table 15
### Driver and Pedestrian Age and Gender (where both known), Pedestrian Casualty Accidents: British Columbia, 1986.

| | PEDESTRIANS | | | | | DRIVERS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | N | % male | Ave. Age | Ave. Age Male | Ave. Age Female | N | % male | Ave. Age | Ave. Age Male | Ave. Age Female |
| **INTERSECTION** | | | | | | | | | | |
| Motorist fault | 780 | 42.2% | 38.4 yr. | 38.1 yr. | 38.6 yr. | 678 | 75.0% | 35.2 yr. | 35.7 yr. | 33.5 yr. |
| Pedestrian fault | 215 | 56.1% | 33.7 yr. | 33.8 yr. | 33.6 yr. | 210 | 72.4% | 35.2 yr. | 35.4 yr. | 34.6 yr. |
| All intersection | 995 | 45.8% | 37.4 yr. | 37.0 yr. | 37.7 yr. | 888 | 74.4% | 35.2 yr. | 35.6 yr. | 33.8 yr. |
| **NON-INTERSECTION** | | | | | | | | | | |
| Motorist fault | 622 | 60.4% | 31.4 yr. | 30.2 yr. | 33.3 yr. | 525 | 73.1% | 34.9 yr. | 34.6 yr. | 35.9 yr. |
| Pedestrian fault | 412 | 66.0% | 28.0 yr. | 27.7 yr. | 28.5 yr. | 386 | 66.1% | 34.4 yr. | 33.7 yr. | 35.8 yr. |
| All Non-intersection | 1,034 | 62.7% | 30.1 yr. | 29.1 yr. | 31.6 yr. | 911 | 70.1% | 34.7 yr. | 34.2 yr. | 35.9 yr. |
| **OVERALL** | 2,029 | 54.5% | 33.6 yr. | 32.5 yr. | 35.1 yr. | 1,799 | 72.3% | 34.9 yr. | 34.9 yr. | 34.9 yr. |

## PERSONS INVOLVED AND CONSEQUENCES:

Table 15 shows the proportion of male pedestrians and drivers in each of intersection and non-intersection motorist-fault and pedestrian-fault pedestrian casualty accidents, and the average age of the male and female pedestrians and drivers in each of these accident categories. Figures 4 and 6 show the age and gender of pedestrians and drivers in pedestrian casualty accidents. Figures 5 and 7 group age and gender totals by those accidents classified as pedestrian fault and those accidents classified as motorist fault for pedestrians and motorists respectively.

From these sources it can be seen that for both pedestrians and drivers there were more males involved than females, and that there were more males at fault than females at fault. To illustrate, 54.5% of the pedestrians and 72.3% of the drivers in pedestrian casualty accidents were male. Further, there was a higher proportion of male pedestrians in the "pedestrian fault" category than in the "motorist fault" category, and a higher proportion of male motorists in the "motorist fault" category than the "pedestrian fault" category for both intersection and non-intersection pedestrian casualty accidents. Finally, there was a higher proportion of male pedestrians in non-intersection than in intersection accidents (62.7% vs. 45.8%).

The relationship between fault and gender is further illustrated in Figure 8, which shows that the percentage of motorist-fault accidents is higher for female pedestrians than for male pedestrians, and lower for female motorists than for male motorists.

Figure 4 . Age & Gender of Pedestrians in Cas. Traf. Acc. British Columbia, 1980-1986.

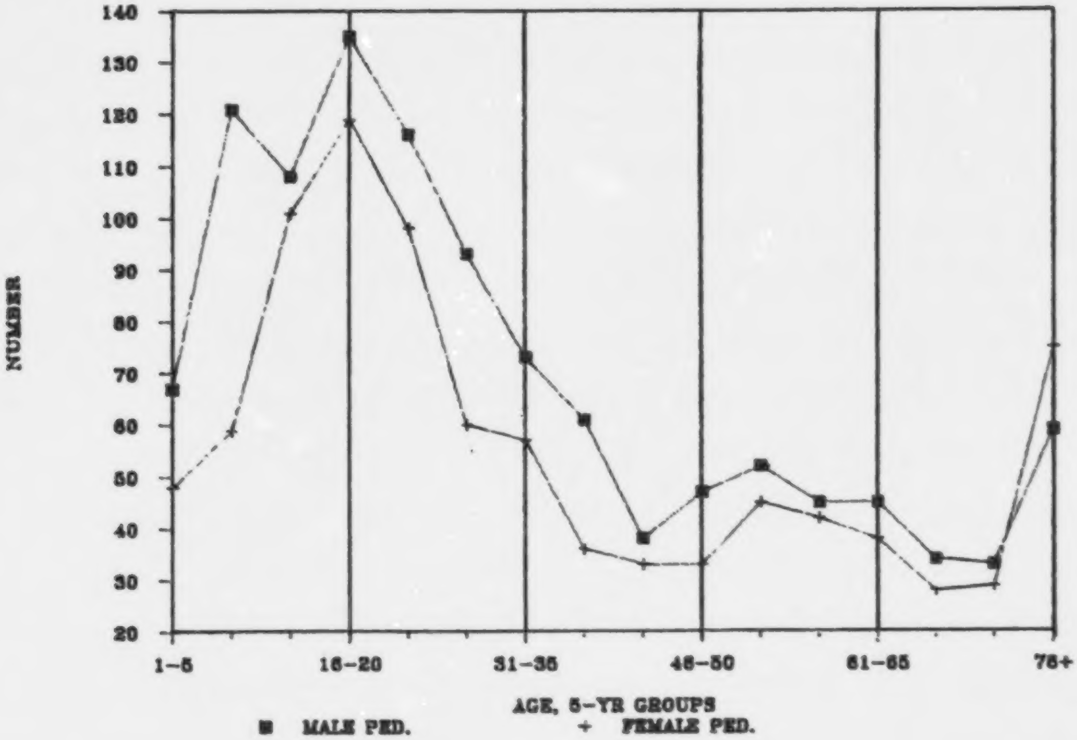


Figure 5. Age & Gender of Pedestrians by Pedestrian vs Motorist Fault Cas. Acc. British Columbia, 1980-1986.

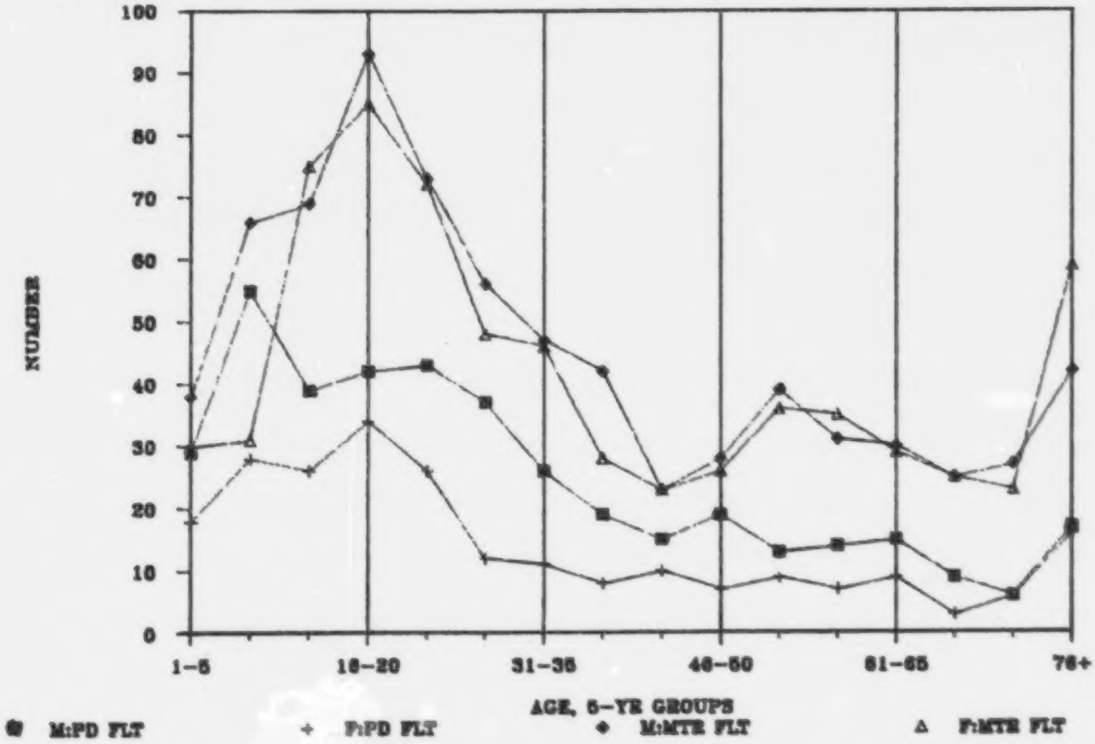


Figure 6. Age & Gender of Motorists in Pedestrian Cas. Acc. British Columbia, 1980-1986.

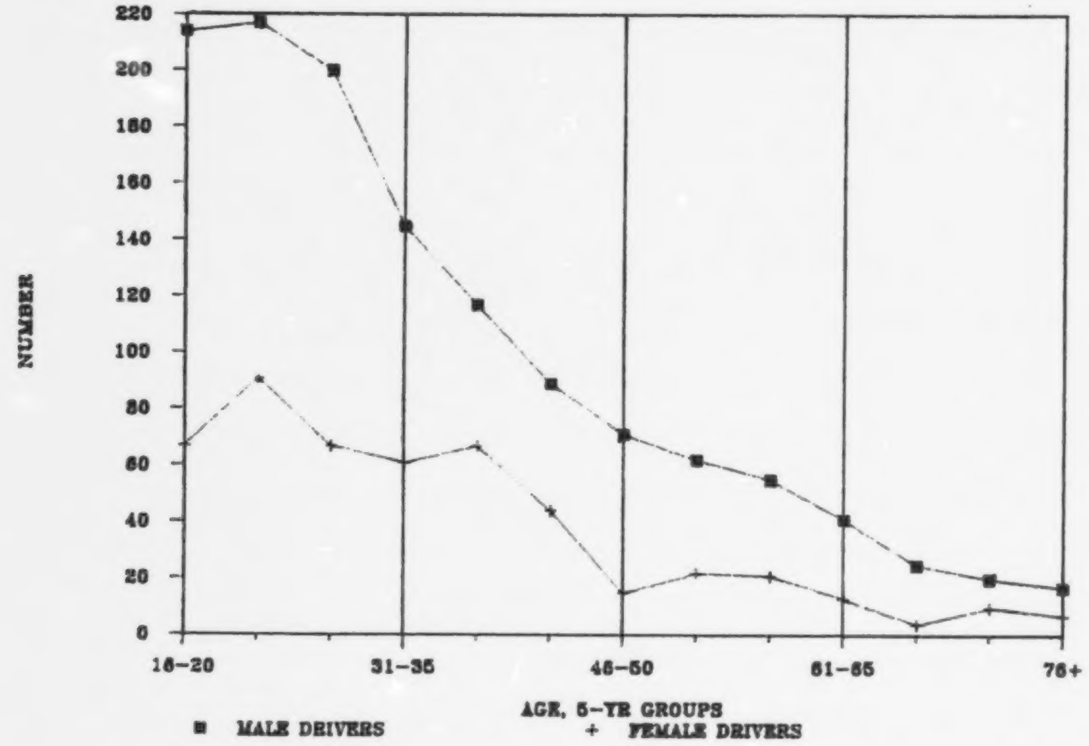
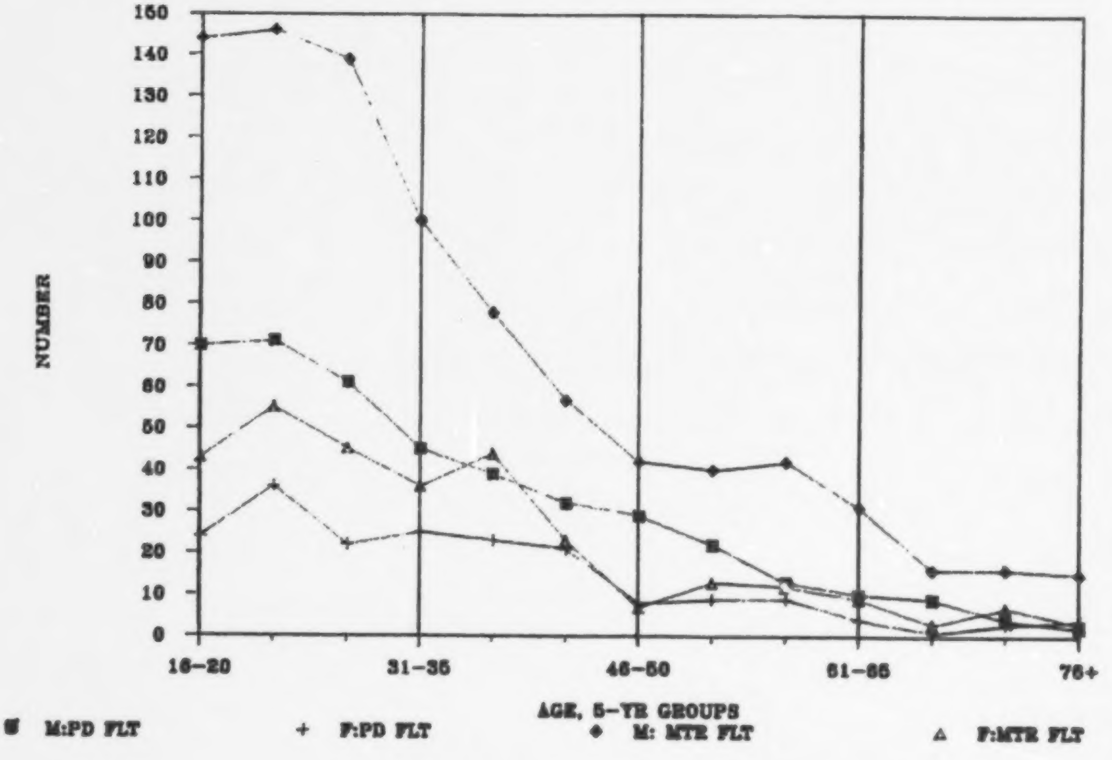


Figure 7. Age & Gender of Motorists in Pedestrian Cas. Acc. by Pedestrian vs Motorist Fault. B.C., 1980-1986.



Turning to the question of pedestrian and driver age, Table 15 and Figures 4 and 6 show that, for both genders, pedestrians tended to be younger when at fault than when not at fault and tended to be younger in non-intersection than in intersection accidents, while there appeared to be no strong systematic differences among drivers' ages in terms of gender, fault, or accident location.

Considering the pedestrian casualties in these accidents, Table 16 shows that in 1986, 2,141 were injured and 88 were killed in all, and that 4% of the accidents were fatal. In addition, a higher proportion of non-intersection than intersection pedestrian casualty accidents produced fatalities, arguably because vehicle speeds between intersections would tend to be higher than those at intersections, while there would be a decreased driver expectation of encountering pedestrians between intersections.

Tables 17 to 19 show the injury locations and types incurred by the pedestrians, as well as their states of consciousness after the accidents. As might be expected, a high proportion of injuries occurred to the lower leg area (33.0%) and there was a high proportion of bruises (45.5%) and fractures (20.0%). Finally, Table 20 shows that the damage to vehicles in pedestrian/motor vehicle casualty accidents was relatively slight, with 92.2% sustaining no damage or light damage.

Figure 8. Age & Gender of Motorists & Pedestrians in Ped. Cas. Acc. by % Motorist Fault. B.C., 1980-1986.

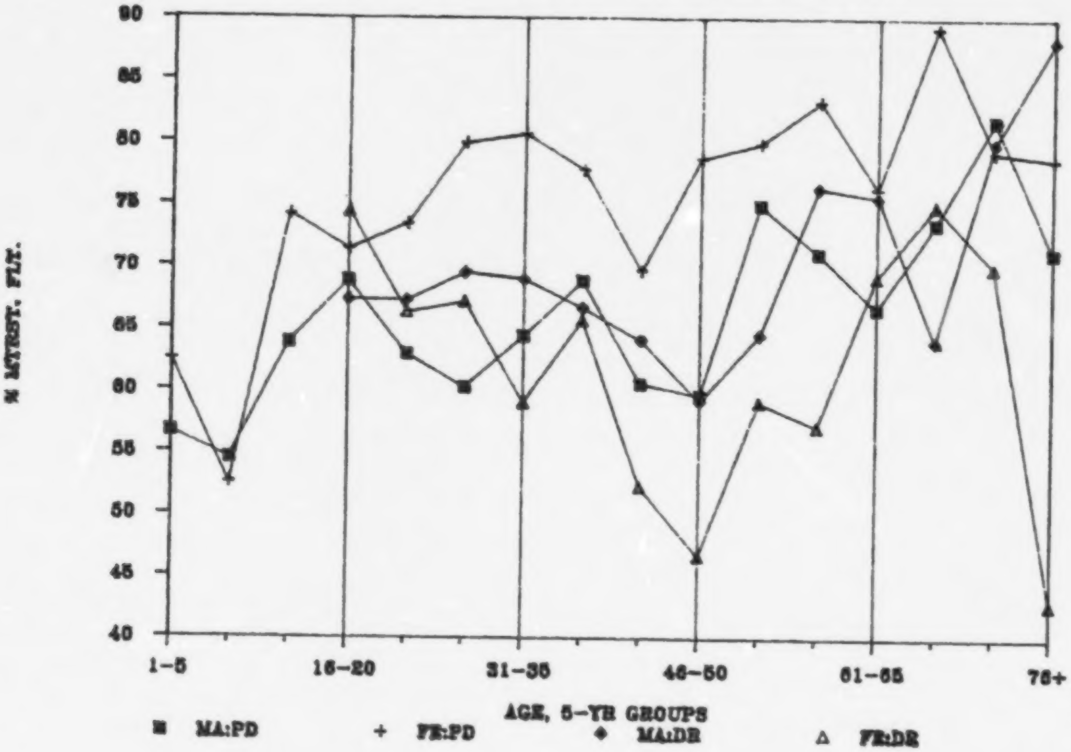


Table 16
Pedestrian Casualties
British Columbia, 1986.

| | PERSONS | | ACCIDENTS |
|---|---|---|---|
| | # injured | # killed | % fatal |
| INTERSECTION | | | |
| Motorist fault | 847 | 26 | 3.2% |
| Pedestrian fault | 222 | 7 | 3.2% |
| Total | 1,069 | 33 | 3.2% |
| NON INTERSECTION | | | |
| Motorist fault | 666 | 29 | 4.5% |
| Pedestrian fault | 406 | 26 | 6.2% |
| Total | 1,072 | 55 | 5.1% |
| OVERALL | 2,141 | 88 | 4.0% |

Table 17
Pedestrian Injury Location:
British Columbia, 1986.

| | INJURY LOCATION | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | No Injury | Head/ Neck | Chest/ Back | Arm/ Shoulder | Abdomen/ Hip | Lower Leg | All Body | B.C. Total |
| # of persons | 14 | 542 | 165 | 269 | 141 | 612 | 108 | 1,851 |
| % of persons | 0.7% | 29.3% | 8.9% | 14.5% | 7.6% | 33.1% | 5.8% | 100% |

Table 18
Pedestrian Injury Type:
British Columbia, 1986.

| | INJURY TYPE | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | None | Abrasion | Bruise | Laceration | Bleeding | Fracture | Dislocation | Burns | Amputation | Concussion | Drowning | Whiplash | B.C. Total |
| # of persons | 14 | 248 | 895 | 202 | 114 | 393 | 39 | 2 | 4 | 42 | 2 | 13 | 1,968 |
| % of persons | 0.7% | 12.6% | 45.5% | 10.3% | 5.8% | 20.0% | 2.0% | 0.1% | 0.2% | 2.1% | 0.1% | 0.7% | 100% |

Table 19
Pedestrian State of Consciousness:
British Columbia, 1986.

| | STATE OF CONSCIOUSNESS | | | | | | |
|---|---|---|---|---|---|---|---|
| | Appears Normal | Agitated | Incoherent | Semi-conscious | Unconscious | Appears Dead | B.C. Total |
| # of persons | 1,279 | 436 | 70 | 137 | 41 | 86 | 2,049 |
| % of persons | 62.4% | 21.3% | 3.4% | 6.7% | 2.0% | 4.2% | 100% |

Table 20
Vehicle Damage Severity,
Pedestrian Casualty Accidents
British Columbia, 1986.

| No Damage | Light Damage | Moderate Damage | Severe Damage | Demolished |
|---|---|---|---|---|
| 61.0% | 31.2% | 6.8% | 0.7% | 0.3% |

## DISCUSSION

Pedestrian casualty traffic accidents comprise about 8% of all casualty traffic accidents, and were at their lowest frequency in Summer and highest in the Fall and early Winter. About half of these accidents occurred at intersections and half between intersections.

Regarding intersection pedestrian/motor vehicle casualty accidents, they tended to be urban, daylight phenomena, with 39% having occurred where there was no traffic control device, 20% where there was a stop sign and 38% where there was a stop light (of those, 66% on a green light, 26% on red, 8% on amber). A relatively high proportion (13.4%) were hit-and-run.

Where these intersection-related pedestrian accidents were classified as "motorist fault", the most common pattern was for the pedestrian to be struck by a vehicle proceeding straight through the intersection (65%), and the second most common pattern involved being struck by a vehicle making a left turn (19%). "Failure to yield right of way" (43.7%), "driving without due care" (23.9%), "weather" (7.1%) and "impaired visibility" (7.1%) were the most frequently cited contributing factors to these motorist-fault pedestrian/motor vehicle intersection casualty accidents. This type of accident comprised 38.6% of all pedestrian accidents in 1986.

Where the intersection-related pedestrian casualty traffic accident was classified as "pedestrian fault" the typical pattern involved the vehicle striking the pedestrian as he/she was crossing the road (77%), with 36% crossing against a signal, 29% crossing with no signal or crosswalk, and 19% crossing at a crosswalk. For the pedestrians, the most commonly cited contributing factors (after "pedestrian error" at 69.2%) were "alcohol" (19.7%), "ignoring traffic control device" (13.8%), and "failure to yield right of way" (14.2%). These accidents comprised 11.4% of all pedestrian/motor vehicle casualty accidents in 1986.

Turning to non-intersection pedestrian casualty traffic accidents, these tended more than their intersection-related counterparts to be less urban, and more associated with darkness and bad weather, although the majority of each type occurred in daylight and in good weather. A similarly high proportion (13.6%) were hit-and-run.

Where these non-intersection pedestrian casualty traffic accidents were classified as "motorist fault", typically the vehicle was "going straight" (68%) or "backing up" (13%) and the pedestrian was "crossing with no signal or crosswalk" (23%), "emerging from behind a vehicle" (16%), or "walking with traffic" (15%). In 29% of these accidents the pedestrian was struck "at 90°" to the vehicle, 16% "head-on" and 13% "side-swiped", while the three most commonly cited contributing factors assigned to the motorist were "driving without due care" (21%), "backing unsafely" (9.7%) and "alcohol" (8.4%). These accidents comprised 28.2% of all pedestrian casualty accidents in 1986.

Where non-intersection pedestrian casualty accidents were classified as "pedestrian fault", typically the vehicle was "going straight" (82%) and the pedestrian was "crossing with no signal or crosswalk" (39%) or "emerging from behind vehicle" (29%), resulting in collisions "at 90°" to the vehicle (54%) or "head-on" (18%). After "pedestrian error" (75.9%), the most commonly cited contributing factor for pedestrians was "alcohol" (24.8%), with no other factor exceeding 3% each. These accidents comprised 21.8% of all pedestrian casualty traffic accidents in 1986.

Turning to the age and gender of pedestrians and drivers in pedestrian/motor vehicle casualty accidents, for both groups there was a higher proportion of males than females in the "at fault" classifications, and the average age of drivers and pedestrians was about the same (34.9 yrs. vs. 33.6 yrs.). On the other hand, while the average ages of male and female drivers was about the same in both intersection and non-intersection "at fault" and "not at fault" classifications, for pedestrians, those in non-intersection accidents averaged about 3 years younger than those in intersection accidents (33.6 yrs. vs. 37.4 yrs.).

Overall, in 1986 there were 2,141 pedestrians injured and 88 killed, with 4% of those casualty accidents producing fatalities. A high proportion of the injuries were to the lower portion of the body.

Arguably, the public's perception of pedestrian traffic accidents is formed by the high-visibility, human-interest stories carried in the news media, and this perception probably includes the impression that these accidents involve children darting out from behind parked cars to be struck down by drinking drivers and/or the impression of innocent pedestrians being hit by motorists who run stop lights. However, as these results show, half of the pedestrian casualty traffic accidents did not occur at intersections, only 19% occurred at controlled intersections, the average age of injured pedestrians was about 34 years, the most common contributing factor for the pedestrian (but not the driver) was alcohol, and about 30% could be classified as the pedestrian's fault.

From the perspective of developing countermeasures to these accidents, programs should target both motorists and pedestrians and should distinguish between intersection and non-intersection accidents. Finally, the significant peak in the frequency of these accidents at the October/November period (just at the change from daylight savings time to standard time with the concommitant increase in darkness during the high-pedestrian volume evening rush hours) ought to be singled out for intensive public awareness campaigns.

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# SECTION 4

## TRAFFIC EPIDEMIOLOGY

Contributing Factors to Casualty Motor Vehicle Crashes by Police Jurisdiction. British Columbia, 1986.

The Number of Injuries and Deaths Associated with Alcohol-related Traffic Accidents by Police Jurisdiction. British Columbia, 1986.

Types and Locations of Casualty Motor Vehicle Crashes by Police Jurisdiction. British Columbia, 1986.

Canadian Criminal Code Traffic Charges by Police Jurisdiction. British Columbia, 1986.

# Contributing Factors to Casualty Motor Vehicle Crashes by Police Jurisdiction. British Columbia, 1986.

# CONTRIBUTING FACTORS TO CASUALTY MOTOR VEHICLE CRASHES IN BRITISH COLUMBIA, 1986

This report consists of a breakdown of selected contributing factors to casualty accidents (i.e. a crash where someone was injured or killed.) Each of the contributing factors was extracted from Traffic Accident Report forms (MV 104) which were submitted to the Motor Vehicle Department of the Ministry of Transportation and Highways by the police department/detachment servicing the location of the crash. It should be noted that as these computer-based files are constantly being updated by the Motor Vehicle Department, any figures produced by that department which contradict figures reported herein ought to be considered correct.

In order to interpret the information in this report, three things need to be kept in mind:

1) In most police departments/detachments, the actual number of casualty accidents is very small, so that a difference of one or two accidents can produce a very large percentage figure. Such large percentages based on a small number of accidents should not be taken as indicating any sort of trend or stable condition. They are most probably entirely random variations from police jurisdiction to police jurisdiction.

2) The contributing factors should be considered in the light of the provincial figures, and these are presented on the first page of this report.

3) Very often there is more than one contributing factor to an accident, therefore these figures can add up to more than 100%.

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Compiled by CounterAttack
A joint program of the Ministry of Attorney General and the Insurance Corporation of British Columbia

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## CONTRIBUTING FACTORS TO CASUALTY MOTOR VEHICLE CRASHES, 1986

| LOCATION | No. of Crashes | % Dr. w/o Due Care | % Alcohol Rel'd | % Dr. Unsafe Speed | % Fail to Yield | % Due to Weather | % Fol. too Close | % Veh. Fault |
|---|---|---|---|---|---|---|---|---|
| BRITISH COLUMBIA - 1982 | 24,262 | 29.7 | 18.9 | 16.7 | 15.7 | 11.8 | 7.0 | 4.1 |
| BRITISH COLUMBIA - 1983 | 22,911 | 30.3 | 17.8 | 15.8 | 17.3 | 10.5 | 7.3 | 4.4 |
| BRITISH COLUMBIA - 1984 | 23,440 | 29.1 | 15.2 | 15.2 | 17.5 | 11.1 | 7.5 | 4.2 |
| BRITISH COLUMBIA - 1985 | 24,972 | 27.0 | 13.1 | 14.6 | 15.9 | 10.8 | 6.8 | 3.9 |
| BRITISH COLUMBIA - 1986 | 28,948 | 27.8 | 13.0 | 15.0 | 16.9 | 9.4 | 7.4 | 3.5 |
| **INDEPENDENT POLICE FORCES** | | | | | | | | |
| Central Saanich Police | 83 | 43.4 | 19.3 | 13.3 | 8.4 | 12.0 | 7.2 | 8.4 |
| Delta Municipal Police | 455 | 29.0 | 14.7 | 10.8 | 22.6 | 7.9 | 9.7 | 4.2 |
| Esquimalt Police Dept. | 118 | 36.4 | 15.3 | 7.6 | 22.9 | 5.9 | 7.6 | 3.4 |
| Matsqui Police Service | 511 | 37.0 | 9.2 | 14.7 | 25.2 | 14.3 | 8.4 | 3.1 |
| Nelson City Police | 32 | 40.6 | 9.4 | 9.4 | 18.8 | 18.8 | 9.4 | 6.3 |
| New Westminster Police | 568 | 18.8 | 10.0 | 6.9 | 17.1 | 7.9 | 6.0 | 2.3 |
| Oak Bay Police Dept. | 71 | 32.4 | 9.9 | 8.5 | 26.8 | 7.0 | 15.5 | 0.0 |
| Port Moody Police Dept. | 155 | 42.6 | 13.5 | 16.8 | 16.8 | 20.6 | 15.5 | 3.2 |
| Saanich Police Dept. | 619 | 32.6 | 10.2 | 11.1 | 18.3 | 8.9 | 14.2 | 2.6 |
| Vancouver City Police | 5,400 | 12.2 | 7.2 | 5.7 | 18.7 | 4.4 | 2.9 | 1.8 |
| Victoria City Police | 821 | 28.3 | 15.5 | 7.6 | 23.1 | 2.8 | 9.6 | 2.7 |
| W. Vancouver Police | 339 | 24.2 | 5.3 | 12.7 | 11.2 | 10.6 | 7.4 | 4.1 |
| **FEDERAL AGENCIES** | | | | | | | | |
| Military Police | 5 | 40.0 | 0.0 | 40.0 | 20.0 | 0.0 | 0.0 | 0.0 |
| National Harbours Board Pol. | 7 | 28.6 | 0.0 | 14.3 | 14.3 | 42.9 | 0.0 | 0.0 |
| **ROYAL CANADIAN MOUNTED POLICE** | | | | | | | | |
| **AUTONOMOUS DETACHMENTS** | | | | | | | | |
| Burnaby | 1,730 | 33.4 | 8.2 | 11.5 | 26.1 | 5.7 | 8.8 | 2.2 |
| Coquitlam Rural | 85 | 20.0 | 10.6 | 16.5 | 10.6 | 10.6 | 1.2 | 0.0 |
| Coquitlam Municipal | 451 | 28.6 | 12.0 | 14.9 | 18.0 | 7.5 | 3.3 | 1.8 |
| Port Coquitlam | 223 | 20.2 | 17.9 | 15.2 | 24.2 | 16.1 | 4.9 | 4.0 |
| North Vancouver City | 350 | 37.7 | 7.7 | 9.7 | 38.6 | 11.1 | 16.0 | 3.1 |
| North Vancouver District | 358 | 39.4 | 10.6 | 9.5 | 23.5 | 10.1 | 17.3 | 5.3 |
| Richmond Township | 1,184 | 33.2 | 7.4 | 11.2 | 25.3 | 8.3 | 13.9 | 2.5 |
| Surrey | 1,934 | 22.2 | 11.6 | 8.8 | 20.3 | 7.7 | 8.5 | 2.6 |
| **CHILLIWACK SUB-DIVISION** | | | | | | | | |
| Abbotsford Rural | 4 | 25.0 | 50.0 | 0.0 | 25.0 | 0.0 | 0.0 | 0.0 |
| Abbotsford Municipal | 159 | 32.1 | 17.0 | 11.9 | 22.6 | 10.1 | 4.4 | 3.8 |
| Agassiz | 75 | 22.7 | 33.3 | 29.3 | 9.3 | 8.0 | 5.3 | 2.7 |
| Boston Bar | 39 | 33.3 | 17.9 | 30.8 | 2.6 | 23.1 | 5.1 | 10.3 |
| Chilliwack Rural | 48 | 39.6 | 22.9 | 27.1 | 0.0 | 12.5 | 6.3 | 0.0 |
| Chilliwack Municipal | 383 | 23.5 | 16.2 | 12.5 | 15.9 | 6.0 | 9.4 | 2.3 |
| Hope | 138 | 20.3 | 15.9 | 28.3 | 2.9 | 21.0 | 0.7 | 5.8 |
| Mission Rural | 35 | 40.0 | 40.0 | 20.0 | 11.4 | 5.7 | 0.0 | 2.9 |
| Mission Municipal | 122 | 31.1 | 18.0 | 14.8 | 13.1 | 11.5 | 4.1 | 4.1 |
| Sumas Freeway Unit C | 124 | 34.7 | 18.5 | 15.3 | 4.8 | 15.3 | 6.5 | 7.3 |

| LOCATION | No. of Crashes | % Dr. w/o Due Care | % Alcohol Rel'd | % Dr. Unsafe Speed | % Fail to Yield | % Due to Weather | % Fol. too Close | % Veh. Fault |
|---|---|---|---|---|---|---|---|---|
| **COURTENAY SUB-DIVISION** | | | | | | | | |
| Alert Bay | 7 | 28.6 | 42.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Campbell River Rural | 86 | 43.0 | 22.1 | 38.4 | 4.7 | 23.3 | 7.0 | 8.1 |
| Campbell River Municipal | 141 | 55.3 | 10.6 | 16.3 | 27.0 | 12.1 | 17.0 | 4.3 |
| Comox Municipal | 39 | 35.9 | 25.6 | 12.8 | 7.7 | 7.7 | 0.0 | 7.7 |
| Courtenay Rural | 184 | 32.6 | 20.7 | 29.9 | 2.7 | 9.8 | 2.2 | 2.7 |
| Courtenay Municipal | 110 | 42.7 | 14.5 | 7.3 | 22.7 | 4.5 | 14.5 | 1.8 |
| Gold River | 15 | 40.0 | 13.3 | 20.0 | 0.0 | 20.0 | 0.0 | 6.7 |
| Parksville | 164 | 47.6 | 22.6 | 29.9 | 10.4 | 9.1 | 7.3 | 3.0 |
| Port Alberni Rural | 66 | 39.4 | 30.3 | 43.9 | 4.5 | 16.7 | 0.0 | 1.5 |
| Port Alberni Municipal | 123 | 31.7 | 15.4 | 19.5 | 24.4 | 4.9 | 7.3 | 9.8 |
| Port Alice | 18 | 38.9 | 11.1 | 11.1 | 0.0 | 27.8 | 0.0 | 16.7 |
| Port Hardy | 58 | 27.6 | 27.6 | 29.3 | 3.4 | 13.8 | 1.7 | 6.9 |
| Port McNeill | 37 | 24.3 | 21.6 | 21.6 | 8.1 | 16.2 | 2.7 | 8.1 |
| Powell River Rural | 32 | 40.6 | 34.4 | 28.1 | 0.0 | 9.4 | 0.0 | 18.8 |
| Powell River Municipal | 60 | 38.3 | 28.3 | 15.0 | 10.0 | 13.3 | 8.3 | 10.0 |
| Quadra Island | 5 | 20.0 | 0.0 | 20.0 | 40.0 | 0.0 | 0.0 | 0.0 |
| Sayward | 32 | 34.4 | 6.3 | 9.4 | 3.1 | 43.8 | 0.0 | 12.5 |
| Tahsis | 10 | 40.0 | 30.0 | 40.0 | 0.0 | 10.0 | 0.0 | 20.0 |
| Tofino | 15 | 20.0 | 13.3 | 26.7 | 0.0 | 33.3 | 0.0 | 0.0 |
| Ucluelet | 29 | 13.8 | 13.8 | 31.0 | 3.4 | 17.2 | 3.4 | 6.9 |
| Texada Island | 2 | 50.0 | 50.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **KAMLOOPS SUB-DIVISION** | | | | | | | | |
| Alexis Creek | 19 | 31.6 | 15.8 | 31.6 | 5.3 | 21.1 | 0.0 | 5.3 |
| Anahim Lake | 9 | 22.2 | 33.3 | 11.1 | 0.0 | 11.1 | 0.0 | 11.1 |
| Ashcroft | 49 | 22.4 | 30.6 | 28.6 | 4.1 | 28.6 | 2.0 | 2.0 |
| Barriere | 44 | 36.4 | 6.8 | 11.4 | 4.5 | 25.0 | 2.3 | 2.3 |
| Chase | 83 | 34.9 | 21.7 | 26.5 | 2.4 | 22.9 | 2.4 | 7.2 |
| Clearwater | 77 | 29.9 | 9.1 | 23.4 | 3.9 | 20.8 | 2.6 | 9.1 |
| Clinton | 50 | 30.0 | 18.0 | 22.0 | 2.0 | 20.0 | 2.0 | 6.0 |
| 100 Mile House | 116 | 37.1 | 18.1 | 37.1 | 4.3 | 20.7 | 0.0 | 8.6 |
| Kamloops Rural | 98 | 51.0 | 18.4 | 40.8 | 0.0 | 24.5 | 2.0 | 5.1 |
| Kamloops Municipal | 603 | 45.3 | 14.1 | 17.4 | 21.2 | 6.3 | 12.8 | 2.5 |
| Lillooet | 66 | 22.7 | 16.7 | 13.6 | 1.5 | 21.2 | 3.0 | 6.1 |
| Logan Lake | 17 | 47.1 | 5.9 | 47.1 | 5.9 | 17.6 | 0.0 | 0.0 |
| Lytton | 37 | 21.6 | 21.6 | 29.7 | 0.0 | 10.8 | 0.0 | 10.8 |
| Merritt Rural | 109 | 35.8 | 18.3 | 40.4 | 3.7 | 11.9 | 5.5 | 5.5 |
| Merritt Municipal | 43 | 41.9 | 20.9 | 14.0 | 25.6 | 4.7 | 11.6 | 0.0 |
| Spences Bridge | 12 | 33.3 | 16.7 | 8.3 | 0.0 | 25.0 | 0.0 | 16.7 |
| Valemount | 62 | 17.7 | 8.1 | 17.7 | 3.2 | 16.1 | 0.0 | 9.7 |
| Williams Lake Rural | 144 | 47.9 | 22.2 | 30.6 | 2.8 | 6.3 | 2.8 | 7.6 |
| Williams Lake Municipal | 100 | 45.0 | 28.0 | 23.0 | 18.0 | 7.0 | 8.0 | 7.0 |
| **KELOWNA SUB-DIVISION** | | | | | | | | |
| Armstrong | 51 | 31.4 | 19.6 | 29.4 | 3.9 | 21.6 | 3.9 | 5.9 |
| Enderby | 38 | 21.1 | 13.2 | 36.8 | 7.9 | 18.4 | 5.3 | 7.9 |
| Falkland | 38 | 36.8 | 10.5 | 31.6 | 2.6 | 34.2 | 0.0 | 2.6 |
| Kelowna Rural | 216 | 26.9 | 16.2 | 20.4 | 8.8 | 11.1 | 6.5 | 3.2 |
| Kelowna Municipal | 535 | 30.5 | 10.5 | 15.3 | 22.1 | 6.0 | 9.9 | 1.9 |

| LOCATION | No. of Crashes | % Dr. w/o Due Care | % Alcohol Rel'd | % Dr. Unsafe Speed | % Fail to Yield | % Due to Weather | % Fol. too Close | % Veh. Fault |
|---|---|---|---|---|---|---|---|---|
| Keremeos | 50 | 20.0 | 14.0 | 18.0 | 6.0 | 12.0 | 6.0 | 4.0 |
| Lumby | 47 | 19.1 | 23.4 | 38.3 | 2.1 | 17.0 | 4.3 | 4.3 |
| Oliver | 44 | 36.4 | 29.5 | 11.4 | 6.8 | 13.6 | 0.0 | 6.8 |
| Osoyoos | 35 | 37.1 | 8.6 | 20.0 | 5.7 | 8.6 | 0.0 | 14.3 |
| Penticton Rural | 77 | 40.3 | 16.9 | 26.0 | 1.3 | 10.4 | 2.6 | 2.6 |
| Penticton Municipal | 197 | 25.4 | 10.7 | 11.2 | 21.8 | 2.5 | 5.6 | 3.0 |
| Princeton | 113 | 29.2 | 8.0 | 46.0 | 1.8 | 15.0 | 1.8 | 8.0 |
| Revelstoke | 129 | 22.5 | 13.2 | 29.5 | 6.2 | 19.4 | 3.9 | 5.4 |
| Salmon Arm Rural | 51 | 35.3 | 23.5 | 33.3 | 5.9 | 17.6 | 0.0 | 5.9 |
| Salmon Arm Municipal | 93 | 30.1 | 23.7 | 18.3 | 12.9 | 7.5 | 12.9 | 5.4 |
| Sicamous | 53 | 18.9 | 5.7 | 30.2 | 1.9 | 18.9 | 5.7 | 5.7 |
| Summerland Municipal | 31 | 22.6 | 9.7 | 29.0 | 6.5 | 16.1 | 16.1 | 3.2 |
| Vernon Rural | 147 | 34.7 | 15.6 | 24.5 | 9.5 | 14.3 | 4.8 | 1.4 |
| Vernon Municipal | 201 | 29.4 | 12.9 | 11.4 | 28.9 | 3.0 | 9.0 | 2.5 |
| **NELSON SUB-DIVISION** | | | | | | | | |
| Castlegar Rural | 53 | 37.7 | 22.6 | 20.8 | 7.5 | 13.2 | 0.0 | 0.0 |
| Castlegar Municipal | 36 | 27.8 | 16.7 | 8.3 | 19.4 | 8.3 | 2.8 | 8.3 |
| Cranbrook Rural | 56 | 35.7 | 30.4 | 25.0 | 8.9 | 21.4 | 1.8 | 5.4 |
| Cranbrook Municipal | 71 | 45.1 | 21.1 | 19.7 | 32.4 | 5.6 | 12.7 | 2.8 |
| Crescent Valley | 7 | 42.9 | 28.6 | 28.6 | 0.0 | 0.0 | 0.0 | 0.0 |
| Creston | 81 | 39.5 | 23.5 | 28.4 | 3.7 | 19.8 | 3.7 | 6.2 |
| Elkford | 12 | 25.0 | 16.7 | 0.0 | 8.3 | 25.0 | 0.0 | 8.3 |
| Fernie | 47 | 44.7 | 19.1 | 17.0 | 6.4 | 17.0 | 8.5 | 4.3 |
| Field | 27 | 7.4 | 11.1 | 44.4 | 0.0 | 11.1 | 11.1 | 7.4 |
| Fruitvale | 16 | 43.8 | 0.0 | 31.3 | 6.3 | 18.8 | 6.3 | 6.3 |
| Golden | 102 | 26.5 | 8.8 | 19.6 | 4.9 | 14.7 | 4.9 | 10.8 |
| Grand Forks | 58 | 22.4 | 10.3 | 25.9 | 13.8 | 19.0 | 6.9 | 6.9 |
| Invermere | 53 | 20.8 | 11.3 | 26.4 | 11.3 | 24.5 | 3.8 | 1.9 |
| Kaslo | 25 | 16.0 | 24.0 | 32.0 | 0.0 | 36.0 | 0.0 | 4.0 |
| Kimberley Rural | 20 | 45.0 | 15.0 | 25.0 | 5.0 | 5.0 | 5.0 | 0.0 |
| Kimberley Municipal | 27 | 33.3 | 11.1 | 18.5 | 3.7 | 25.9 | 7.4 | 0.0 |
| Midway | 29 | 55.2 | 37.9 | 31.0 | 0.0 | 17.2 | 0.0 | 0.0 |
| Nakusp | 39 | 41.0 | 20.5 | 7.7 | 7.7 | 17.9 | 0.0 | 2.6 |
| Nelson | 66 | 30.3 | 13.6 | 22.7 | 3.0 | 36.4 | 6.1 | 3.0 |
| New Denver | 11 | 63.6 | 36.4 | 27.3 | 0.0 | 18.2 | 0.0 | 9.1 |
| Radium | 38 | 23.7 | 15.8 | 28.9 | 2.6 | 26.3 | 5.3 | 15.8 |
| Rossland | 18 | 44.4 | 11.1 | 27.8 | 0.0 | 16.7 | 0.0 | 11.1 |
| Salmo | 33 | 27.3 | 27.3 | 15.2 | 6.1 | 9.1 | 3.0 | 9.1 |
| Sparwood | 38 | 42.1 | 13.2 | 26.3 | 2.6 | 21.1 | 7.9 | 13.2 |
| Trail Rural | 17 | 35.3 | 17.6 | 17.6 | 5.9 | 29.4 | 5.9 | 0.0 |
| Trail Municipal | 40 | 27.5 | 15.0 | 7.5 | 20.0 | 22.5 | 10.0 | 2.5 |
| **PRINCE GEORGE SUB-DIVISION** | | | | | | | | |
| Burns Lake | 54 | 14.8 | 22.2 | 20.4 | 3.7 | 22.2 | 3.7 | 16.7 |
| Chetwynd | 66 | 34.8 | 21.2 | 31.8 | 3.0 | 27.3 | 0.0 | 4.5 |
| Dawson Creek Rural | 86 | 31.4 | 23.3 | 23.3 | 3.5 | 7.0 | 8.1 | 4.7 |
| Dawson Creek Municipal | 71 | 39.4 | 23.9 | 12.7 | 22.5 | 8.5 | 1.4 | 1.4 |
| Fort Nelson | 48 | 29.2 | 10.4 | 27.1 | 0.0 | 12.5 | 0.0 | 6.3 |
| Fort St. James | 29 | 51.7 | 34.5 | 48.3 | 3.4 | 3.4 | 3.4 | 13.8 |

| LOCATION | No. of Crashes | % Dr. w/oDue Care | % Alcohol Rel'd | % Dr. Unsafe Speed | % Fail to Yield | % Due to Weather | % Fol. too Close | % Veh. Fault |
|---|---|---|---|---|---|---|---|---|
| Fort St. John Rural | 101 | 24.8 | 15.8 | 37.6 | 3.0 | 8.9 | 4.0 | 5.0 |
| Fort St. John Municipal | 80 | 22.5 | 18.8 | 17.5 | 25.0 | 3.8 | 5.0 | 6.3 |
| Fraser Lake | 28 | 35.7 | 14.3 | 28.6 | 0.0 | 10.7 | 7.1 | 0.0 |
| Hudson Hope | 11 | 27.3 | 27.3 | 27.3 | 9.1 | 0.0 | 9.1 | 0.0 |
| Mackenzie Rural | 28 | 32.1 | 10.7 | 35.7 | 0.0 | 14.3 | 0.0 | 3.6 |
| Mackenzie Municipal | 21 | 33.3 | 14.3 | 42.9 | 4.8 | 9.5 | 9.5 | 4.8 |
| McBride | 31 | 9.7 | 19.4 | 9.7 | 3.2 | 22.6 | 0.0 | 6.5 |
| Prince George Rural | 158 | 31.6 | 24.7 | 31.6 | 0.6 | 17.1 | 4.4 | 1.3 |
| Prince George City | 502 | 37.3 | 19.1 | 17.7 | 20.9 | 9.6 | 7.0 | 4.0 |
| Quesnel Rural | 136 | 26.5 | 16.9 | 25.7 | 6.6 | 14.0 | 3.7 | 2.9 |
| Quesnel Municipal | 80 | 32.5 | 12.5 | 5.0 | 21.3 | 6.3 | 12.5 | 6.3 |
| Tumbler Ridge | 26 | 19.2 | 15.4 | 26.9 | 0.0 | 26.9 | 3.8 | 3.8 |
| Vanderhoof | 50 | 44.0 | 30.0 | 28.0 | 6.0 | 16.0 | 6.0 | 4.0 |
| Watson Lake, Teslin | 10 | 0.0 | 0.0 | 30.0 | 0.0 | 10.0 | 0.0 | 0.0 |
| Wells | 9 | 44.4 | 33.3 | 55.6 | 0.0 | 11.1 | 0.0 | 11.1 |
| **PRINCE RUPERT SUB-DIVISION** | | | | | | | | |
| Atlin | 11 | 45.5 | 27.3 | 18.2 | 9.1 | 18.2 | 0.0 | 36.4 |
| Bella Bella | 1 | 100.0 | 0.0 | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Bella Coola | 15 | 46.7 | 20.0 | 33.3 | 0.0 | 20.0 | 6.7 | 6.7 |
| Cassiar | 9 | 22.0 | 22.2 | 33.3 | 0.0 | 11.1 | 0.0 | 0.0 |
| Dease Lake | 16 | 6.3 | 31.3 | 6.3 | 0.0 | 6.3 | 0.0 | 0.0 |
| Granisle | 7 | 42.9 | 71.4 | 42.9 | 0.0 | 0.0 | 0.0 | 14.3 |
| Hazelton | 70 | 20.0 | 30.0 | 5.7 | 4.3 | 25.7 | 2.9 | 0.0 |
| Houston | 37 | 18.9 | 13.5 | 35.1 | 0.0 | 10.8 | 5.4 | 8.1 |
| Kitimat Rural | 18 | 33.3 | 27.8 | 44.4 | 0.0 | 22.2 | 0.0 | 0.0 |
| Kitimat Municipal | 30 | 40.0 | 20.0 | 26.7 | 3.3 | 40.0 | 6.7 | 3.3 |
| Masset | 21 | 19.0 | 28.6 | 57.1 | 0.0 | 0.0 | 0.0 | 9.5 |
| New Aiyansh | 8 | 25.0 | 25.0 | 25.0 | 0.0 | 12.5 | 0.0 | 12.5 |
| Prince Rupert Rural | 24 | 33.3 | 25.0 | 25.0 | 8.3 | 37.5 | 0.0 | 0.0 |
| Prince Rupert City | 99 | 36.4 | 18.2 | 13.1 | 22.2 | 10.1 | 8.1 | 3.0 |
| Queen Charlotte | 10 | 40.0 | 50.0 | 40.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Smithers | 75 | 38.7 | 28.0 | 38.7 | 10.7 | 10.7 | 1.3 | 8.0 |
| Stewart | 35 | 22.9 | 11.4 | 20.0 | 2.9 | 20.0 | 0.0 | 2.9 |
| Terrace Rural | 80 | 27.5 | 18.8 | 26.3 | 5.0 | 25.0 | 2.5 | 1.3 |
| Terrace Municipal | 61 | 34.4 | 16.4 | 21.3 | 9.8 | 9.8 | 3.3 | 0.0 |
| **VANCOUVER SUB-DIVISION** | | | | | | | | |
| Gibsons | 75 | 34.7 | 22.7 | 30.7 | 13.3 | 8.0 | 2.7 | 12.0 |
| Langley City | 252 | 33.7 | 11.5 | 15.9 | 23.8 | 7.1 | 8.7 | 1.6 |
| Langley Township | 420 | 25.5 | 16.9 | 21.4 | 23.1 | 16.9 | 5.2 | 5.0 |
| Maple Ridge Rural | 54 | 37.0 | 16.7 | 24.1 | 7.4 | 3.7 | 14.8 | 9.3 |
| Maple Ridge Municipal | 344 | 37.5 | 12.2 | 17.7 | 16.0 | 8.7 | 9.6 | 2.0 |
| Pemberton | 35 | 37.1 | 31.4 | 37.1 | 2.9 | 11.4 | 0.0 | 2.9 |
| Sechelt | 52 | 28.8 | 28.8 | 38.5 | 3.8 | 15.4 | 7.7 | 5.8 |
| Squamish Rural | 65 | 29.2 | 10.8 | 29.2 | 1.5 | 21.5 | 1.5 | 9.2 |
| Squamish Municipal | 106 | 25.5 | 16.0 | 29.2 | 10.4 | 11.3 | 4.7 | 4.7 |
| University | 73 | 43.8 | 13.7 | 26.0 | 21.9 | 11.0 | 6.8 | 2.7 |
| Vancouver-Bowen Island | 7 | 14.3 | 28.6 | 42.9 | 0.0 | 14.3 | 0.0 | 0.0 |
| Whistler | 59 | 27.1 | 18.6 | 42.4 | 3.4 | 28.8 | 6.8 | 10.2 |

| LOCATION | No. of Crashes | % Dr. w/oDue Care | % Alcohol Rel'd | % Dr. Unsafe Speed | % Fail to Yield | % Due to Weather | % Fol. too Close | % Veh. Fault |
|---|---|---|---|---|---|---|---|---|
| White Rock | 112 | 30.4 | 8.9 | 3.6 | 30.4 | 5.4 | 8.9 | 2.7 |
| Deas Isle Freeway Patrol (Unit A) | 229 | 27.5 | 9.2 | 7.9 | 2.6 | 7.9 | 28.8 | 4.4 |
| Port Mann Freeway Patrol (Unit B) | 463 | 33.3 | 12.7 | 13.8 | 1.3 | 9.7 | 22.7 | 5.8 |
| **VICTORIA SUB-DIVISION** | | | | | | | | |
| Chemainus | 35 | 34.3 | 20.0 | 22.9 | 5.7 | 17.1 | 8.6 | 2.9 |
| Colwood | 276 | 42.0 | 21.0 | 29.3 | 12.3 | 10.1 | 8.7 | 6.2 |
| Duncan | 163 | 24.5 | 19.6 | 24.5 | 17.2 | 8.0 | 11.0 | 5.5 |
| Duncan - North Cowichan | 82 | 31.7 | 15.9 | 22.0 | 13.4 | 12.2 | 9.8 | 3.7 |
| Gabriola Island | 28 | 21.4 | 35.7 | 32.1 | 7.1 | 10.7 | 7.1 | 3.6 |
| Ganges | 46 | 39.1 | 41.3 | 30.4 | 4.3 | 6.5 | 2.2 | 8.7 |
| Ladysmith | 71 | 26.8 | 19.7 | 22.5 | 8.5 | 14.1 | 4.2 | 5.6 |
| Lake Cowichan | 20 | 25.0 | 25.0 | 25.0 | 0.0 | 30.0 | 5.0 | 15.0 |
| Nanaimo Rural | 65 | 29.2 | 23.1 | 21.5 | 9.2 | 9.2 | 6.2 | 4.6 |
| Nanaimo Municipal | 498 | 24.5 | 10.4 | 19.5 | 17.9 | 7.6 | 13.7 | 5.0 |
| Pender Island | 6 | 16.7 | 16.7 | 16.7 | 0.0 | 16.7 | 0.0 | 0.0 |
| Shawnigan Lake | 86 | 40.7 | 15.1 | 20.9 | 10.5 | 18.6 | 4.7 | 3.5 |
| Sidney Rural | 8 | 37.5 | 12.5 | 25.0 | 25.0 | 0.0 | 0.0 | 0.0 |
| Sidney Municipal | 109 | 44.0 | 20.2 | 19.3 | 25.7 | 2.8 | 7.3 | 3.7 |
| Sooke | 93 | 33.3 | 26.9 | 32.3 | 3.2 | 21.5 | 5.4 | 7.5 |

# The Number of Injuries and Deaths Associated with Alcohol-related Traffic Accidents by Police Jurisdiction. British Columbia, 1986.

# THE NUMBER OF INJURIES AND DEATHS ASSOCIATED WITH DRINKING DRIVING BY POLICE JURISDICTION. BRITISH COLUMBIA, 1986.

Traffic accidents that produce injury or death are investigated by the police in British Columbia, and in the process of investigation, the officers judge whether or not the accident was caused by the driver(s) being impaired. These judgements are recorded on the Traffic Accident Investigation Form (MV104) and are compiled into computer-readable data by the Motor Vehicle Division of the Ministry of Transportation and Highways (B.C.)

This report lists, for each police reporting jurisdiction, the number of persons injured in 1985 and the percentage of those who were injured in alcohol-related traffic accidents (as taken from the MV104). In addition, similar information is presented for fatalities. It should be noted that as these computer-based files are constantly being updated by the Motor Vehicle Department, any figures produced by that department which contradict figures reported herein ought to be considered correct.

In order to interpret the information in this report, three things need to be kept in mind:

1) In most police departments/detachments, the actual number of accidents is very small, so that a difference of one or two accidents can produce a very large percentage figure. Such large percentages based on a small number of accidents should not be taken as indicating any sort of trend or stable condition. They are most probably entirely random variations from police jurisdiction to police jurisdiction.

2) This information should be considered in the light of the provincial figures, and these are presented on the first page of this report.

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A joint program of the Ministry of Attorney General and
the Insurance Corporation of British Columbia

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## THE NUMBER OF INJURIES AND DEATHS ASSOCIATED WITH DRINKING DRIVING BY POLICE JURISDICTION: BRITISH COLUMBIA, 1986

| LOCATION | Total # persons injured | # Injured Alcohol Related | Total # persons killed | # Killed Alcohol Related |
|---|---|---|---|---|
| BRITISH COLUMBIA - 1985 | 34,371 | 4,954 (14.4%) | 483 | 144 (29.8%) |
| BRITISH COLUMBIA - 1986 | 40,378 | 5,688 (14.0%) | 599 | 210 (35.1%) |
| **INDEPENDENT FORCES** | | | | |
| Central Saanich Police | 122 | 21 | 2 | 1 |
| Delta Municipal Police | 611 | 90 | 7 | 3 |
| Esquimalt Police Dept. | 150 | 24 | 0 | 0 |
| Matsqui Police Service | 767 | 79 | 8 | 0 |
| Nelson City Police | 39 | 4 | 0 | 0 |
| New Westminster Police | 821 | 91 | 5 | 4 |
| Oak Bay Police Dept. | 91 | 10 | 0 | 0 |
| Port Moody Police Dept. | 211 | 31 | 1 | 0 |
| Saanich Police Dept. | 817 | 92 | 11 | 3 |
| Vancouver City Police | 7,034 | 561 | 48 | 9 |
| Victoria City Police | 1,050 | 190 | 4 | 3 |
| West Vancouver Police Dept. | 462 | 27 | 0 | 0 |
| **FEDERAL AGENCIES** | | | | |
| Military Police | 7 | 0 | 0 | 0 |
| National Harbours Board Police | 9 | 0 | 0 | 0 |
| **ROYAL CANADIAN MOUNTED POLICE** | | | | |
| **AUTONOMOUS DETACHMENTS** | | | | |
| Burnaby | 2,383 | 238 | 14 | 3 |
| Coquitlam Rural | 123 | 13 | 1 | 0 |
| Coquitlam Municipal | 658 | 86 | 4 | 2 |
| Port Coquitlam | 318 | 77 | 1 | 0 |
| North Vancouver City | 455 | 41 | 3 | 0 |
| North Vancouver District | 448 | 47 | 3 | 0 |
| Richmond Township | 1,544 | 120 | 14 | 6 |
| Surrey | 2,921 | 348 | 22 | 7 |
| **CHILLIWACK SUB-DIVISION** | | | | |
| Abbotsford Rural | 10 | 5 | 0 | 0 |
| Abbotsford Municipal | 221 | 36 | 2 | 2 |
| Agassiz | 124 | 42 | 7 | 7 |
| Boston Bar | 55 | 9 | 1 | 0 |
| Chilliwack Rural | 59 | 14 | 0 | 0 |
| Chilliwack Municipal | 513 | 86 | 8 | 3 |
| Hope | 191 | 30 | 8 | 4 |
| Mission Rural | 59 | 29 | 1 | 0 |
| Mission Municipal | 180 | 31 | 2 | 1 |
| Sumas Freeway Patrol (Unit C) | 197 | 37 | 2 | 0 |

| LOCATION | Total # persons injured | # Injured Alcohol Related | Total # persons killed | # Killed Alcohol Related |
|---|---|---|---|---|
| **COURTENAY SUB-DIVISION** | | | | |
| Alert Bay | 9 | 4 | 0 | 0 |
| Campbell River Rural | 141 | 34 | 6 | 2 |
| Campbell River Municipal | 194 | 24 | 0 | 0 |
| Comox Municipal | 47 | 13 | 1 | 0 |
| Courtenay Rural | 281 | 57 | 7 | 2 |
| Courtenay Municipal | 153 | 23 | 1 | 0 |
| Gold River | 21 | 3 | 0 | 0 |
| Parksville | 234 | 53 | 11 | 2 |
| Port Alberni Rural | 98 | 32 | 3 | 1 |
| Port Alberni Municipal | 158 | 28 | 2 | 1 |
| Port Alice | 27 | 6 | 0 | 0 |
| Port Hardy | 84 | 24 | 0 | 0 |
| Port McNeill | 53 | 10 | 0 | 0 |
| Powell River Rural | 47 | 19 | 1 | 1 |
| Powell River Municipal | 77 | 24 | 2 | 2 |
| Quadra Island | 7 | 0 | 0 | 0 |
| Sayward | 44 | 2 | 0 | 0 |
| Tahsis | 17 | 6 | 0 | 0 |
| Tofino | 18 | 2 | 3 | 0 |
| Ucluelet | 41 | 6 | 1 | 0 |
| Texada Island | 4 | 3 | 0 | 0 |
| **KAMLOOPS SUB-DIVISION** | | | | |
| Alexis Creek | 30 | 6 | 1 | 0 |
| Anahim Lake | 14 | 5 | 0 | 0 |
| Ashcroft | 78 | 27 | 2 | 1 |
| Barriere | 73 | 6 | 1 | 0 |
| Chase | 130 | 27 | 4 | 0 |
| Clearwater | 132 | 9 | 4 | 0 |
| Clinton | 69 | 11 | 7 | 3 |
| 100 Mile House | 173 | 28 | 7 | 5 |
| Kamloops Rural | 151 | 38 | 3 | 0 |
| Kamloops Municipal | 817 | 120 | 12 | 5 |
| Lillooet | 97 | 20 | 5 | 0 |
| Logan Lake | 26 | 2 | 0 | 0 |
| Lytton | 59 | 10 | 1 | 0 |
| Merritt Rural | 175 | 29 | 3 | 1 |
| Merritt Municipal | 56 | 13 | 0 | 0 |
| Spences Bridge | 17 | 3 | 0 | 0 |
| Valemount | 99 | 6 | 4 | 0 |
| Williams Lake Rural | 217 | 55 | 5 | 2 |
| Williams Lake Municipal | 125 | 34 | 7 | 6 |
| **KELOWNA SUB-DIVISION** | | | | |
| Armstrong | 70 | 12 | 3 | 2 |
| Enderby | 57 | 6 | 3 | 0 |
| Falkland | 52 | 5 | 0 | 0 |
| Kelowna Rural | 302 | 47 | 5 | 4 |
| Kelowna Municipal | 723 | 77 | 10 | 4 |

| LOCATION | Total # persons injured | # Injured Alcohol Related | Total # persons killed | # Killed Alcohol Related |
|---|---|---|---|---|
| Keremeos | 64 | 10 | 3 | 1 |
| Lumby | 66 | 15 | 1 | 0 |
| Oliver | 61 | 22 | 3 | 3 |
| Osoyoos | 53 | 4 | 4 | 1 |
| Penticton Rural | 113 | 24 | 5 | 0 |
| Penticton Municipal | 266 | 29 | 3 | 2 |
| Princeton | 178 | 14 | 9 | 1 |
| Revelstoke | 179 | 20 | 17 | 2 |
| Salmon Arm Rural | 71 | 16 | 1 | 0 |
| Salmon Arm Municipal | 147 | 32 | 5 | 3 |
| Sicamous | 70 | 4 | 3 | 0 |
| Summerland Municipal | 48 | 4 | 2 | 2 |
| Vernon Rural | 204 | 30 | 5 | 1 |
| Vernon Municipal | 283 | 34 | 3 | 3 |
| **NELSON SUB-DIVISION** | | | | |
| Castlegar Rural | 84 | 19 | 1 | 1 |
| Castlegar Municipal | 53 | 9 | 0 | 0 |
| Cranbrook Rural | 92 | 32 | 0 | 0 |
| Cranbrook Municipal | 94 | 25 | 0 | 0 |
| Crescent Valley | 10 | 2 | 1 | 0 |
| Creston | 122 | 34 | 1 | 0 |
| Elkford | 13 | 2 | 0 | 0 |
| Fernie | 68 | 16 | 2 | 0 |
| Field | 40 | 3 | 3 | 1 |
| Fruitvale | 24 | 0 | 0 | 0 |
| Golden | 151 | 16 | 6 | 1 |
| Grand Forks | 89 | 8 | 2 | 0 |
| Invermere | 78 | 11 | 1 | 1 |
| Kaslo | 38 | 9 | 1 | 1 |
| Kimberley Rural | 34 | 5 | 1 | 1 |
| Kimberley Municipal | 36 | 2 | 1 | 1 |
| Midway | 46 | 17 | 5 | 5 |
| Nakusp | 52 | 15 | 3 | 2 |
| Nelson | 94 | 14 | 2 | 0 |
| New Denver | 14 | 5 | 0 | 0 |
| Radium | 49 | 7 | 1 | 0 |
| Rossland | 19 | 3 | 1 | 0 |
| Salmo | 51 | 19 | 5 | 0 |
| Sparwood | 58 | 8 | 0 | 0 |
| Trail Rural | 26 | 3 | 0 | 0 |
| Trail Municipal | 49 | 7 | 1 | 0 |
| **PRINCE GEORGE SUB-DIVISION** | | | | |
| Burns Lake | 76 | 19 | 5 | 0 |
| Chetwynd | 97 | 17 | 1 | 1 |
| Dawson Creek Rural | 119 | 27 | 3 | 1 |
| Dawson Creek Municipal | 94 | 29 | 0 | 0 |
| Fort Nelson | 68 | 6 | 5 | 2 |
| Fort St. James | 53 | 22 | 0 | 0 |

| LOCATION | Total # persons injured | # Injured Alcohol Related | Total # persons killed | # Killed Alcohol Related |
|---|---|---|---|---|
| Fort St. John Rural | 165 | 33 | 6 | 4 |
| Fort St. John Municipal | 101 | 26 | 0 | 0 |
| Fraser Lake | 46 | 9 | 3 | 3 |
| Hudson Hope | 11 | 2 | 1 | 1 |
| Mackenzie Rural | 43 | 4 | 1 | 1 |
| Mackenzie Municipal | 30 | 5 | 0 | 0 |
| McBride | 43 | 10 | 0 | 0 |
| Prince George Rural | 240 | 63 | 12 | 6 |
| Prince George City | 702 | 155 | 10 | 6 |
| Quesnel Rural | 202 | 30 | 7 | 3 |
| Quesnel Municipal | 110 | 12 | 1 | 1 |
| Tumbler Ridge | 33 | 7 | 1 | 0 |
| Vanderhoof | 70 | 20 | 8 | 8 |
| Watson Lake, Teslin | 14 | 0 | 3 | 0 |
| Wells | 11 | 5 | 0 | 0 |
| **PRINCE RUPERT SUB-DIVISION** | | | | |
| Atlin | 10 | 3 | 1 | 0 |
| Bella Coola | 21 | 5 | 2 | 2 |
| Cassiar | 17 | 1 | 1 | 1 |
| Dease Lake | 22 | 5 | 1 | 1 |
| Granisle | 15 | 10 | 0 | 0 |
| Hazelton | 116 | 36 | 4 | 2 |
| Houston | 52 | 8 | 2 | 0 |
| Kitimat Rural | 24 | 8 | 1 | 0 |
| Kitimat Municipal | 38 | 6 | 5 | 2 |
| Masset | 33 | 9 | 1 | 0 |
| New Aiyansh | 16 | 5 | 0 | 0 |
| Prince Rupert Rural | 41 | 16 | 2 | 2 |
| Prince Rupert Municipal | 131 | 28 | 0 | 0 |
| Queen Charlotte City | 17 | 7 | 0 | 0 |
| Smithers | 129 | 29 | 4 | 2 |
| Stewart | 51 | 10 | 2 | 0 |
| Terrace Rural | 110 | 25 | 6 | 1 |
| Terrace Municipal | 76 | 10 | 2 | 1 |
| **VANCOUVER SUB-DIVISION** | | | | |
| Gibsons | 111 | 34 | 1 | 0 |
| Langley City | 346 | 43 | 3 | 0 |
| Langley Township | 582 | 92 | 13 | 2 |
| Maple Ridge Rural | 84 | 12 | 3 | 0 |
| Maple Ridge Municipal | 484 | 57 | 4 | 1 |
| Pemberton | 46 | 14 | 1 | 1 |
| Sechelt | 64 | 17 | 1 | 1 |
| Squamish Rural | 105 | 12 | 4 | 0 |
| Squamish Municipal | 154 | 27 | 2 | 2 |
| University | 91 | 15 | 0 | 0 |
| Vancouver-Bowen Island | 7 | 2 | 0 | 0 |
| Whistler | 36 | 15 | 2 | 0 |

| LOCATION | Total # persons injured | # Injured Alcohol Related | Total # persons killed | # Killed Alcohol Related |
|---|---|---|---|---|
| White Rock | 166 | 18 | 1 | 0 |
| Deas Isle Freeway Patrol (Unit A) | 361 | 32 | 4 | 2 |
| Port Mann Freeway Patrol (Unit B) | 683 | 108 | 7 | 3 |
| **VICTORIA SUB-DIVISION** | | | | |
| Chemainus | 57 | 15 | 4 | 0 |
| Colwood | 393 | 83 | 6 | 3 |
| Duncan | 240 | 56 | 7 | 1 |
| Duncan - North Cowichan | 125 | 19 | 2 | 1 |
| Gabriola Island | 34 | 11 | 2 | 1 |
| Ganges | 67 | 26 | 0 | 0 |
| Ladysmith | 116 | 19 | 2 | 2 |
| Lake Cowichan | 31 | 7 | 0 | 0 |
| Nanaimo Rural | 98 | 27 | 3 | 0 |
| Nanaimo Municipal | 692 | 71 | 10 | 2 |
| Pender Island | 6 | 1 | 0 | 0 |
| Shawnigan Lake | 145 | 26 | 2 | 1 |
| Sidney Rural | 12 | 1 | 0 | 0 |
| Sidney Municipal | 177 | 36 | 0 | 0 |
| Sooke | 132 | 41 | 7 | 1 |

# Types and Locations of Casualty Motor Vehicle Crashes by Police Jurisdiction. British Columbia, 1986.

# TYPES AND LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES IN BRITISH COLUMBIA, 1986.

This report consists of a breakdown of the types and locations of casualty accidents (i.e. a crash where someone was injured or killed.) Each type and location was extracted from the Traffic Accident Report forms (MV 104) which were submitted to the Motor Vehicle Department of the Ministry of Transportation and Highways by the police department/detachment servicing the location of the crash. It should be noted that as these computer-based files are constantly being updated by the Motor Vehicle Department, any figures produced by that department which contradict figures reported herein ought to be considered correct.

In order to interpret the information in this report, two things need to be kept in mind:

1) In most police departments/detachments, the actual number of casualty accidents is very small, so that a difference of one or two accidents can produce a very large percentage figure. Such large percentages based on a small number of accidents should not be taken as indicating any sort of trend or stable condition. They are most probably entirely random variations from police jurisdiction to police jurisdiction.

2) These figures should be considered in light of the provincial figures presented on the first page of the report.

October, 1987

Compiled by: CounterAttack, a joint program of the Ministry
Attorney General and the Insurance Corporation of
British Columbia

Direct enquiries to: Dr. W. Mercer
Director of Research
(604) 660-2604

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | | | | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | % At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
| BRITISH COLUMBIA, 1985 | 25,155 | - | - | - | - | 4.3% | 5.1% | 7.4% | 45.0% | 40.6% | 6.1% | 2.1% | 6.1% |
| BRITISH COLUMBIA, 1986 | 29,138 | 67.3% | 7.1% | 7.0% | 8.2% | 4.9% | 4.7% | 9.2% | 45.9% | 39.8% | 6.6% | 2.2% | 5.5% |
| **INDEPENDENT POLICE FORCES** | | | | | | | | | | | | | |
| Central Saanich | 84 | 59.5% | 8.3% | 7.1% | 7.1% | 2.4% | 7.1% | 8.3% | 33.3% | 51.9% | 6.2% | 0.0% | 8.6% |
| Delta Municipal | 457 | 70.9% | 7.4% | 10.5% | 10.3% | 5.5% | 2.4% | 5.5% | 48.8% | 30.7% | 12.0% | 0.4% | 8.0% |
| Esquimalt | 118 | 75.4% | 9.3% | 14.4% | 15.3% | 8.5% | 2.5% | 5.9% | 50.9% | 29.8% | 9.6% | 0.0% | 9.6% |
| Matsqui | 513 | 76.6% | 7.2% | 7.0% | 7.4% | 4.5% | 2.9% | 5.5% | 51.7% | 29.5% | 10.9% | 0.6% | 7.3% |
| Nelson City | 32 | 68.8% | 9.4% | 12.5% | 9.4% | 0.0% | 0.0% | 12.5% | 56.3% | 31.3% | 3.1% | 0.0% | 9.4% |
| New Westminster | 594 | 83.3% | 6.6% | 3.7% | 10.4% | 8.8% | 5.2% | 7.1% | 56.8% | 32.7% | 2.7% | 1.4% | 6.4% |
| Oak Bay | 71 | 84.5% | 5.6% | 22.5% | 0.0% | 4.2% | 1.4% | 5.6% | 64.8% | 26.8% | 4.2% | 0.0% | 4.2% |
| Port Moody | 155 | 80.6% | 7.7% | 5.8% | 6.5% | 4.5% | 1.9% | 1.3% | 50.0% | 41.9% | 5.4% | 0.0% | 2.7% |
| Saanich | 624 | 71.5% | 7.5% | 11.4% | 9.5% | 4.3% | 4.3% | 5.3% | 48.5% | 31.6% | 12.6% | 0.2% | 7.1% |
| Vancouver City | 5,418 | 81.4% | 6.7% | 9.9% | 14.9% | 6.7% | 3.8% | 10.3% | 61.9% | 30.3% | 3.8% | 2.0% | 1.9% |
| Victoria City | 826 | 82.1% | 10.7% | 20.1% | 9.2% | 10.3% | 1.8% | 6.7% | 64.7% | 29.7% | 2.2% | 0.1% | 3.3% |
| W. Vancouver | 340 | 71.5% | 5.3% | 5.9% | 6.8% | 2.6% | 4.7% | 6.2% | 31.8% | 37.2% | 4.5% | 13.2% | 13.2% |
| **FEDERAL AGENCIES** | | | | | | | | | | | | | |
| Military Police | 5 | 40.0% | 20.0% | 20.0% | 0.0% | 0.0% | 0.0% | 0.0% | 50.0% | 0.0% | 0.0% | 0.0% | 50.0% |
| National Harbours Board | 7 | 42.9% | 0.0% | 14.3% | 28.6% | 0.0% | 42.9% | 0.0% | 14.3% | 0.0% | 0.0% | 14.3% | 71.4% |
| **ROYAL CANADIAN MOUNTED POLICE** | | | | | | | | | | | | | |
| **AUTONOMOUS DETACHMENTS** | | | | | | | | | | | | | |
| Burnaby | 1,738 | 84.2% | 6.9% | 4.7% | 8.9% | 5.6% | 3.3% | 7.0% | 61.1% | 28.5% | 6.6% | 0.2% | 3.5% |
| Coquitlam Rural | 85 | 74.1% | 10.6% | 2.4% | 5.9% | 5.9% | 3.5% | 9.4% | 54.4% | 38.0% | 3.8% | 0.0% | 3.8% |
| Coquitlam Municipal | 452 | 75.9% | 8.8% | 5.3% | 6.2% | 6.4% | 4.9% | 6.4% | 51.8% | 32.8% | 5.4% | 0.7% | 9.3% |
| Port Coquitlam | 224 | 73.2% | 6.7% | 6.7% | 7.6% | 5.4% | 1.8% | 6.3% | 56.4% | 28.6% | 3.6% | 3.2% | 8.2% |
| North Vancouver City | 351 | 84.6% | 8.5% | 8.0% | 10.3% | 8.3% | 2.6% | 4.8% | 60.7% | 28.4% | 6.9% | 0.6% | 3.4% |
| North Vancouver District | 358 | 75.7% | 7.0% | 9.5% | 10.6% | 3.6% | 3.1% | 6.7% | 48.4% | 37.4% | 7.6% | 1.1% | 5.4% |
| Richmond Township | 1,188 | 81.9% | 5.7% | 9.6% | 6.7% | 4.1% | 4.1% | 7.9% | 51.4% | 27.4% | 10.7% | 3.1% | 7.3% |
| Surrey | 2,003 | 80.7% | 6.0% | 5.7% | 7.3% | 7.2% | 5.4% | 8.3% | 54.4% | 30.1% | 10.6% | 0.7% | 4.2% |

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | | | | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | % At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
| **CHILLIWACK SUB-DIVISION** | | | | | | | | | | | | | |
| Abbotsford Rural | 4 | 50.0% | 25.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 25.0% | 50.0% | 25.0% | 0.0% | 0.0% |
| Abbotsford Municipal | 159 | 67.3% | 3.8% | 3.8% | 5.7% | 5.7% | 5.7% | 5.0% | 48.7% | 25.0% | 15.1% | 0.0% | 11.2% |
| Agassiz | 75 | 41.3% | 10.7% | 1.3% | 5.3% | 4.0% | 10.7% | 4.0% | 26.0% | 58.9% | 4.1% | 4.1% | 6.8% |
| Boston Bar | 39 | 38.5% | 5.1% | 2.6% | 2.6% | 5.1% | 28.2% | 20.5% | 10.3% | 76.9% | 2.6% | 0.0% | 10.3% |
| Chilliwack Rural | 48 | 33.3% | 14.6% | 6.3% | 2.1% | 6.3% | 2.1% | 2.1% | 9.5% | 64.3% | 9.5% | 2.4% | 14.3% |
| Chilliwack Municipal | 384 | 68.0% | 7.8% | 10.2% | 6.5% | 5.2% | 2.6% | 5.7% | 40.3% | 37.3% | 13.9% | 2.1% | 6.4% |
| Hope | 138 | 34.1% | 6.5% | 1.4% | 3.6% | 1.4% | 12.3% | 16.7% | 11.2% | 74.6% | 2.2% | 8.2% | 3.7% |
| Mission Rural | 35 | 45.7% | 5.7% | 2.9% | 0.0% | 5.7% | 5.7% | 0.0% | 47.1% | 41.2% | 2.9% | 5.9% | 2.9% |
| Mission Municipal | 122 | 59.8% | 8.2% | 8.2% | 10.7% | 4.9% | 3.3% | 3.3% | 38.8% | 43.0% | 9.1% | 5.0% | 4.1% |
| Sumas Freeway Patrol (Unit C) | 124 | 31.5% | 3.2% | 0.0% | 0.0% | 1.6% | 8.9% | 9.7% | 10.2% | 76.3% | 0.0% | 4.2% | 9.3% |
| **COURTENAY SUB-DIVISION** | | | | | | | | | | | | | |
| Alert Bay | 7 | 28.6% | 14.3% | 0.0% | 14.3% | 0.0% | 0.0% | 0.0% | 16.7% | 50.0% | 16.7% | 0.0% | 16.7% |
| Campbell River Rural | 86 | 39.5% | 5.8% | 5.8% | 1.2% | 0.0% | 8.1% | 2.3% | 14.7% | 70.7% | 8.0% | 1.3% | 5.3% |
| Campbell River Municipal | 141 | 66.7% | 7.8% | 12.8% | 15.6% | 5.7% | 3.5% | 2.1% | 47.1% | 27.9% | 15.4% | 1.5% | 8.1% |
| Comox Municipal | 39 | 61.5% | 12.8% | 20.5% | 5.1% | 5.1% | 0.0% | 5.1% | 47.4% | 42.1% | 7.9% | 0.0% | 2.6% |
| Courtenay Rural | 184 | 40.8% | 14.7% | 3.8% | 1.1% | 2.7% | 3.8% | 4.3% | 17.8% | 59.8% | 10.7% | 2.4% | 9.5% |
| Courtenay Municipal | 111 | 82.0% | 9.9% | 13.5% | 3.6% | 4.5% | 1.8% | 4.5% | 61.3% | 13.5% | 15.3% | 0.0% | 9.9% |
| Gold River | 15 | 20.0% | 13.3% | 0.0% | 0.0% | 6.7% | 13.3% | 0.0% | 18.2% | 72.7% | 0.0% | 0.0% | 9.1% |
| Parksville | 164 | 47.0% | 4.9% | 1.8% | 1.8% | 1.8% | 4.9% | 5.5% | 32.1% | 54.1% | 5.7% | 3.1% | 5.0% |
| Port Alberni Rural | 66 | 22.7% | 9.1% | 1.5% | 7.6% | 1.5% | 1.5% | 7.6% | 11.1% | 66.7% | 3.7% | 3.7% | 14.8% |
| Port Alberni Municipal | 123 | 64.2% | 3.3% | 7.3% | 13.0% | 3.3% | 0.8% | 4.9% | 63.4% | 23.6% | 6.5% | 1.6% | 4.9% |
| Port Alice | 18 | 16.7% | 11.1% | 0.0% | 11.1% | 5.6% | 0.0% | 11.1% | 13.3% | 80.0% | 6.7% | 0.0% | 0.0% |
| Port Hardy | 59 | 32.2% | 10.2% | 1.7% | 5.1% | 3.4% | 11.9% | 10.2% | 16.7% | 77.8% | 1.9% | 0.0% | 3.7% |
| Port McNeill | 37 | 24.3% | 5.4% | 2.7% | 0.0% | 0.0% | 8.1% | 5.4% | 11.8% | 73.5% | 2.9% | 2.9% | 8.8% |
| Powell River Rural | 32 | 25.0% | 12.5% | 3.1% | 3.1% | 0.0% | 0.0% | 3.1% | 7.1% | 57.1% | 10.7% | 7.1% | 17.9% |
| Powell River Municipal | 61 | 59.0% | 4.9% | 6.6% | 9.8% | 3.3% | 0.0% | 0.0% | 41.7% | 41.7% | 5.0% | 0.0% | 11.7% |
| Quadra Island | 5 | 80.0% | 20.0% | 20.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 75.0% | 25.0% | 0.0% | 0.0% |
| Sayward | 32 | 21.9% | 12.5% | 0.0% | 3.1% | 0.0% | 0.0% | 6.3% | 6.3% | 84.4% | 0.0% | 6.3% | 3.1% |

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | | | | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | % At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
| **COURTENAY SUB-DIVISION** cont' | | | | | | | | | | | | | |
| Tahsis | 10 | 30.0% | 0.0% | 0.0% | 0.0% | 0.0% | 10.0% | 10.0% | 22.2% | 66.7% | 0.0% | 0.0% | 11.1% |
| Tofino | 15 | 26.7% | 13.3% | 6.7% | 20.0% | 0.0% | 0.0% | 0.0% | 20.0% | 66.7% | 13.3% | 0.0% | 0.0% |
| Ucluelet | 29 | 31.0% | 17.2% | 0.0% | 3.4% | 0.0% | 3.4% | 13.8% | 30.4% | 52.2% | 8.7% | 4.3% | 4.3% |
| Texada Island | 2 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% |
| **KAMLOOPS SUB-DIVISION** | | | | | | | | | | | | | |
| Alexis Creek | 19 | 15.8% | 0.0% | 0.0% | 0.0% | 0.0% | 15.8% | 0.0% | 21.1% | 68.4% | 5.3% | 0.0% | 5.3% |
| Anahim Lake | 9 | 11.1% | 0.0% | 0.0% | 11.1% | 0.0% | 0.0% | 11.1% | 14.3% | 28.6% | 0.0% | 0.0% | 57.1% |
| Ashcroft | 49 | 26.5% | 6.1% | 0.0% | 0.0% | 0.0% | 8.2% | 8.2% | 16.3% | 69.4% | 4.1% | 2.0% | 8.2% |
| Barriere | 44 | 20.5% | 0.0% | 0.0% | 0.0% | 0.0% | 11.4% | 27.3% | 20.9% | 72.1% | 4.7% | 0.0% | 2.3% |
| Chase | 83 | 30.1% | 8.4% | 1.2% | 0.0% | 0.0% | 10.8% | 15.7% | 16.0% | 70.4% | 2.5% | 7.4% | 3.7% |
| Clearwater | 77 | 23.4% | 5.2% | 1.3% | 1.3% | 1.3% | 15.6% | 35.1% | 17.1% | 68.4% | 5.3% | 2.6% | 6.6% |
| Clinton | 52 | 26.9% | 13.5% | 0.0% | 1.9% | 0.0% | 13.5% | 15.4% | 3.8% | 94.2% | 0.0% | 1.9% | 0.0% |
| 100 Mile House | 116 | 19.8% | 6.9% | 0.0% | 5.2% | 3.4% | 6.0% | 6.9% | 8.4% | 74.8% | 8.4% | 0.0% | 8.4% |
| Kamloops Rural | 98 | 22.4% | 11.2% | 0.0% | 1.0% | 0.0% | 13.3% | 20.4% | 7.4% | 84.2% | 2.1% | 0.0% | 6.3% |
| Kamloops Municipal | 604 | 68.5% | 9.1% | 7.5% | 7.6% | 5.1% | 3.8% | 7.6% | 50.4% | 33.6% | 4.8% | 2.9% | 8.2% |
| Lillooet | 66 | 24.2% | 7.6% | 3.0% | 6.1% | 4.5% | 3.0% | 1.5% | 10.3% | 75.9% | 3.4% | 3.4% | 6.9% |
| Logan Lake | 17 | 35.3% | 0.0% | 5.9% | 0.0% | 0.0% | 11.8% | 5.9% | 5.9% | 70.6% | 17.6% | 0.0% | 5.9% |
| Lytton | 37 | 16.2% | 5.4% | 2.7% | 0.0% | 0.0% | 10.8% | 8.1% | 2.9% | 85.3% | 5.9% | 2.9% | 2.9% |
| Merritt Rural | 109 | 28.4% | 5.5% | 0.0% | 0.9% | 0.9% | 6.4% | 22.9% | 6.6% | 82.1% | 2.8% | 2.8% | 5.7% |
| Merritt Municipal | 43 | 58.1% | 9.3% | 4.7% | 14.0% | 0.0% | 4.7% | 14.0% | 41.9% | 44.2% | 9.3% | 2.3% | 2.3% |
| Spences Bridge | 12 | 33.3% | 0.0% | 0.0% | 0.0% | 0.0% | 25.0% | 0.0% | 8.3% | 50.0% | 0.0% | 16.7% | 25.0% |
| Valemount | 62 | 25.8% | 4.8% | 3.2% | 0.0% | 1.6% | 6.5% | 37.1% | 23.0% | 68.9% | 0.0% | 1.6% | 6.6% |
| Williams Lake Rural | 144 | 29.2% | 6.3% | 1.4% | 2.1% | 1.4% | 5.6% | 9.0% | 15.6% | 71.1% | 6.7% | 0.7% | 5.9% |
| Williams Lake Municipal | 100 | 61.0% | 4.0% | 2.0% | 14.0% | 8.0% | 2.0% | 11.0% | 38.4% | 35.4% | 15.2% | 0.0% | 11.1% |
| **KELOWNA SUB-DIVISION** | | | | | | | | | | | | | |
| Armstrong | 51 | 29.4% | 9.8% | 3.9% | 2.0% | 3.9% | 2.0% | 9.8% | 23.5% | 66.7% | 3.9% | 2.0% | 3.9% |
| Enderby | 38 | 44.7% | 15.8% | 0.0% | 5.3% | 0.0% | 13.2% | 34.2% | 13.9% | 58.3% | 11.1% | 0.0% | 16.7% |
| Falkland | 38 | 28.9% | 2.6% | 0.0% | 2.6% | 0.0% | 13.2% | 5.3% | 7.9% | 92.1% | 0.0% | 0.0% | 0.0% |
| Kelowna Rural | 218 | 53.2% | 9.2% | 3.2% | 3.2% | 2.3% | 6.9% | 11.5% | 28.4% | 56.7% | 8.2% | 1.4% | 5.3% |
| Kelowna Municipal | 537 | 73.7% | 6.9% | 13.0% | 6.7% | 3.5% | 3.2% | 3.4% | 54.2% | 30.8% | 9.3% | 1.3% | 4.4% |

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | | | | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | % At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
| **KELOWNA SUB-DIVISION** cont' | | | | | | | | | | | | | |
| Keremeos | 50 | 46.0% | 6.0% | 0.0% | 6.0% | 0.0% | 12.0% | 24.0% | 23.4% | 66.0% | 8.5% | 0.0% | 2.1% |
| Lumby | 47 | 27.7% | 6.4% | 4.3% | 2.1% | 0.0% | 6.4% | 10.6% | 4.3% | 80.9% | 8.5% | 2.1% | 4.3% |
| Oliver | 44 | 34.1% | 9.1% | 0.0% | 9.1% | 4.5% | 0.0% | 15.9% | 24.4% | 53.7% | 4.9% | 0.0% | 17.1% |
| Osoyoos | 36 | 50.0% | 5.6% | 2.8% | 8.3% | 5.6% | 13.9% | 25.0% | 22.6% | 58.1% | 16.1% | 0.0% | 3.2% |
| Penticton Rural | 77 | 39.0% | 6.5% | 5.2% | 3.9% | 1.3% | 3.9% | 10.4% | 20.3% | 60.8% | 8.1% | 1.4% | 9.5% |
| Penticton Municipal | 198 | 72.2% | 13.1% | 12.1% | 9.1% | 8.6% | 1.5% | 11.6% | 51.3% | 34.0% | 7.3% | 0.0% | 7.3% |
| Princeton | 114 | 31.6% | 7.9% | 2.6% | 0.9% | 1.8% | 13.2% | 17.5% | 7.9% | 80.2% | 0.0% | 5.9% | 5.9% |
| Revelstoke | 129 | 53.5% | 10.1% | 8.5% | 2.3% | 3.9% | 10.9% | 29.5% | 21.0% | 54.0% | 7.3% | 3.2% | 14.5% |
| Salmon Arm Rural | 51 | 41.2% | 7.8% | 2.0% | 3.9% | 2.0% | 3.9% | 21.6% | 20.8% | 62.5% | 2.1% | 4.2% | 10.4% |
| Salmon Arm Municipal | 93 | 51.6% | 8.6% | 3.2% | 4.3% | 0.0% | 7.5% | 23.7% | 41.1% | 43.3% | 11.1% | 2.2% | 2.2% |
| Sicamous | 53 | 37.7% | 11.3% | 1.9% | 0.0% | 0.0% | 9.4% | 32.1% | 13.5% | 67.3% | 5.8% | 3.8% | 9.6% |
| Summerland Municipal | 31 | 41.9% | 3.2% | 9.7% | 0.0% | 0.0% | 9.7% | 16.1% | 32.3% | 51.6% | 9.7% | 3.2% | 3.2% |
| Vernon Rural | 147 | 41.5% | 10.2% | 2.0% | 2.7% | 3.4% | 3.4% | 15.0% | 23.2% | 66.2% | 7.0% | 0.7% | 2.8% |
| Vernon Municipal | 201 | 74.6% | 10.0% | 8.5% | 9.5% | 4.0% | 4.5% | 12.4% | 60.6% | 27.3% | 7.1% | 2.0% | 3.0% |
| **NELSON SUB-DIVISION** | | | | | | | | | | | | | |
| Castlegar Rural | 54 | 22.2% | 1.9% | 3.7% | 0.0% | 1.9% | 3.7% | 7.4% | 20.4% | 72.2% | 1.9% | 0.0% | 5.6% |
| Castlegar Municipal | 36 | 77.8% | 2.8% | 13.9% | 0.0% | 8.3% | 2.8% | 5.6% | 44.1% | 32.4% | 14.7% | 0.0% | 8.8% |
| Cranbrook Rural | 56 | 25.0% | 12.5% | 0.0% | 0.0% | 0.0% | 1.8% | 17.9% | 11.3% | 75.5% | 0.0% | 3.8% | 9.4% |
| Cranbrook Municipal | 71 | 88.7% | 2.8% | 7.0% | 4.2% | 5.6% | 4.2% | 12.7% | 54.9% | 32.4% | 8.5% | 0.0% | 4.2% |
| Crescent Valley | 8 | 25.0% | 12.5% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 12.5% | 87.5% | 0.0% | 0.0% | 0.0% |
| Creston | 82 | 22.0% | 11.0% | 1.2% | 2.4% | 0.0% | 4.9% | 22.0% | 26.7% | 61.3% | 4.0% | 1.3% | 6.7% |
| Elkford | 12 | 16.7% | 8.3% | 8.3% | 0.0% | 0.0% | 0.0% | 8.3% | 16.7% | 83.3% | 0.0% | 0.0% | 0.0% |
| Fernie | 48 | 31.3% | 6.3% | 0.0% | 6.3% | 0.0% | 18.8% | 39.6% | 29.5% | 52.3% | 11.4% | 0.0% | 6.8% |
| Field | 27 | 33.3% | 7.4% | 0.0% | 7.4% | 0.0% | 18.5% | 70.4% | 22.2% | 74.1% | 0.0% | 3.7% | 0.0% |
| Fruitvale | 16 | 50.0% | 0.0% | 6.3% | 6.3% | 0.0% | 12.5% | 6.3% | 25.0% | 50.0% | 12.5% | 0.0% | 12.5% |
| Golden | 102 | 36.3% | 5.9% | 5.9% | 4.9% | 0.0% | 15.7% | 37.3% | 21.4% | 57.1% | 9.2% | 6.1% | 6.1% |
| Grand Forks | 58 | 41.4% | 6.9% | 1.7% | 1.7% | 1.7% | 3.4% | 3.4% | 28.3% | 56.6% | 0.0% | 0.0% | 15.1% |
| Invermere | 53 | 35.8% | 3.8% | 1.9% | 1.9% | 0.0% | 9.4% | 52.8% | 23.1% | 61.5% | 5.8% | 3.8% | 5.8% |
| Kaslo | 26 | 19.2% | 11.5% | 0.0% | 0.0% | 0.0% | 7.7% | 15.4% | 8.7% | 78.3% | 4.3% | 4.3% | 4.3% |
| Kimberley Rural | 20 | 25.0% | 10.0% | 0.0% | 0.0% | 0.0% | 5.0% | 15.0% | 13.3% | 46.7% | 20.0% | 6.7% | 13.3% |
| Kimberley Municipal | 27 | 51.9% | 3.7% | 11.1% | 7.4% | 0.0% | 0.0% | 3.7% | 40.7% | 44.4% | 14.8% | 0.0% | 0.0% |

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986<br>% Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986<br>% At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NELSON SUB-DIVISION** cont' | | | | | | | | | | | | | |
| Midway | 29 | 6.9% | 0.0% | 0.0% | 3.4% | 0.0% | 6.9% | 17.2% | 10.3% | 89.7% | 0.0% | 0.0% | 0.0% |
| Nakusp | 39 | 25.6% | 10.3% | 5.1% | 0.0% | 0.0% | 7.7% | 17.9% | 17.1% | 65.7% | 0.0% | 0.0% | 17.1% |
| Nelson | 66 | 27.3% | 4.5% | 0.0% | 0.0% | 3.0% | 4.5% | 9.1% | 15.2% | 81.8% | 0.0% | 1.5% | 1.5% |
| New Denver | 11 | 18.2% | 9.1% | 0.0% | 0.0% | 0.0% | 36.4% | 27.3% | 20.0% | 80.0% | 0.0% | 0.0% | 0.0% |
| Radium | 38 | 21.1% | 5.3% | 0.0% | 2.6% | 0.0% | 15.8% | 36.8% | 16.2% | 73.0% | 2.7% | 5.4% | 2.7% |
| Rossland | 18 | 38.9% | 16.7% | 5.6% | 11.1% | 0.0% | 11.1% | 0.0% | 43.8% | 50.0% | 6.3% | 0.0% | 0.0% |
| Salmo | 33 | 30.3% | 12.1% | 3.0% | 3.0% | 0.0% | 6.1% | 15.2% | 22.6% | 61.3% | 3.2% | 3.2% | 9.7% |
| Sparwood | 38 | 34.2% | 2.6% | 5.3% | 2.6% | 2.6% | 21.1% | 36.8% | 21.1% | 76.3% | 0.0% | 0.0% | 2.6% |
| Trail Rural | 17 | 41.2% | 17.6% | 0.0% | 5.9% | 0.0% | 0.0% | 23.5% | 17.6% | 82.4% | 0.0% | 0.0% | 0.0% |
| Trail Municipal | 40 | 72.5% | 7.5% | 5.0% | 7.5% | 5.0% | 2.5% | 7.5% | 42.5% | 52.5% | 2.5% | 0.0% | 2.5% |
| **PRINCE GEORGE SUB-DIVISION** | | | | | | | | | | | | | |
| Burns Lake | 54 | 29.6% | 9.3% | 0.0% | 5.6% | 0.0% | 5.6% | 11.1% | 16.0% | 76.0% | 4.0% | 0.0% | 4.0% |
| Chetwynd | 66 | 16.7% | 3.0% | 0.0% | 3.0% | 0.0% | 9.1% | 19.7% | 14.8% | 67.2% | 0.0% | 0.0% | 18.0% |
| Dawson Creek Rural | 86 | 38.4% | 4.7% | 1.2% | 3.5% | 5.8% | 12.8% | 31.4% | 20.5% | 69.9% | 3.6% | 2.4% | 3.6% |
| Dawson Creek Municipal | 71 | 73.2% | 7.0% | 9.9% | 9.9% | 8.5% | 1.4% | 22.5% | 56.3% | 29.6% | 5.6% | 1.4% | 7.0% |
| Fort Nelson | 48 | 16.7% | 8.3% | 2.1% | 14.6% | 0.0% | 18.8% | 54.2% | 6.5% | 80.4% | 8.7% | 2.2% | 2.2% |
| Fort St. James | 29 | 37.9% | 6.9% | 6.9% | 0.0% | 0.0% | 10.3% | 0.0% | 16.0% | 60.0% | 16.0% | 0.0% | 8.0% |
| Fort St. John Rural | 101 | 26.7% | 3.0% | 0.0% | 4.0% | 2.0% | 9.9% | 18.8% | 12.6% | 75.8% | 4.2% | 3.2% | 4.2% |
| Fort St. John Municipal | 80 | 75.0% | 6.3% | 7.5% | 13.8% | 13.8% | 5.0% | 8.8% | 61.0% | 22.1% | 11.7% | 0.0% | 5.2% |
| Fraser Lake | 28 | 32.1% | 0.0% | 0.0% | 7.1% | 3.6% | 14.3% | 7.1% | 10.7% | 82.1% | 0.0% | 3.6% | 3.6% |
| Hudson Hope | 11 | 27.3% | 27.3% | 9.1% | 0.0% | 0.0% | 0.0% | 18.2% | 20.0% | 60.0% | 10.0% | 0.0% | 10.0% |
| Mackenzie Rural | 28 | 10.7% | 3.6% | 0.0% | 0.0% | 0.0% | 10.7% | 14.3% | 3.8% | 88.5% | 0.0% | 3.8% | 3.8% |
| Mackenzie Municipal | 21 | 66.7% | 4.8% | 19.0% | 0.0% | 0.0% | 4.8% | 0.0% | 57.9% | 36.8% | 0.0% | 0.0% | 5.3% |
| McBride | 31 | 9.7% | 6.5% | 0.0% | 3.2% | 0.0% | 9.7% | 22.6% | 10.0% | 90.0% | 0.0% | 0.0% | 0.0% |
| Prince George Rural | 158 | 26.6% | 0.6% | 0.6% | 3.2% | 2.5% | 8.9% | 7.0% | 9.5% | 76.4% | 2.7% | 1.4% | 10.1% |
| Prince George City | 503 | 69.2% | 8.2% | 7.2% | 9.1% | 6.2% | 4.6% | 6.4% | 55.3% | 32.8% | 6.1% | 0.6% | 5.3% |
| Quesnel Rural | 136 | 32.4% | 8.1% | 0.7% | 0.0% | 0.7% | 8.8% | 7.4% | 19.4% | 65.9% | 7.0% | 2.3% | 5.4% |
| Quesnel Municipal | 80 | 72.5% | 6.3% | 2.5% | 8.8% | 0.0% | 2.5% | 7.5% | 41.6% | 42.9% | 9.1% | 1.3% | 5.2% |
| Tumbler Ridge | 26 | 34.6% | 15.4% | 0.0% | 3.8% | 0.0% | 15.4% | 7.7% | 20.0% | 50.0% | 0.0% | 15.0% | 15.0% |
| Vanderhoof | 50 | 30.0% | 0.0% | 2.0% | 8.0% | 2.0% | 14.0% | 4.0% | 17.0% | 68.1% | 10.6% | 0.0% | 4.3% |
| Watson Lake, Teslin | 11 | 9.1% | 0.0% | 0.0% | 0.0% | 0.0% | 27.3% | 81.8% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% |
| Wells | 9 | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 85.7% | 0.0% | 14.3% | 0.0% |

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | | | | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | % At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
| **PRINCE RUPERT SUB-DIVISION** | | | | | | | | | | | | | |
| Atlin | 11 | 9.1% | 0.0% | 0.0% | 0.0% | 0.0% | 9.1% | 45.5% | 33.3% | 55.6% | 0.0% | 0.0% | 11.1% |
| Bella Coola | 15 | 13.3% | 0.0% | 0.0% | 6.7% | 0.0% | 6.7% | 0.0% | 0.0% | 92.9% | 0.0% | 7.1% | 0.0% |
| Cassiar | 9 | 11.1% | 0.0% | 0.0% | 0.0% | 0.0% | 22.2% | 44.4% | 0.0% | 88.9% | 0.0% | 11.1% | 0.0% |
| Dease Lake | 16 | 12.5% | 6.3% | 0.0% | 0.0% | 0.0% | 31.3% | 31.3% | 0.0% | 87.5% | 0.0% | 0.0% | 12.5% |
| Granisle | 7 | 14.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 85.7% | 0.0% | 14.3% | 0.0% |
| Hazelton | 70 | 21.4% | 2.9% | 0.0% | 7.1% | 1.4% | 5.7% | 5.7% | 11.8% | 79.4% | 1.5% | 0.0% | 7.4% |
| Houston | 37 | 8.1% | 2.7% | 0.0% | 5.4% | 0.0% | 5.4% | 5.4% | 8.8% | 88.2% | 2.9% | 0.0% | 0.0% |
| Kitimat Rural | 18 | 33.3% | 5.6% | 0.0% | 5.6% | 0.0% | 0.0% | 5.6% | 22.2% | 61.1% | 5.6% | 11.1% | 0.0% |
| Kitimat Municipal | 30 | 63.3% | 10.0% | 16.7% | 3.3% | 3.3% | 3.3% | 3.3% | 31.0% | 51.7% | 10.3% | 3.4% | 3.4% |
| Masset | 21 | 19.0% | 9.5% | 0.0% | 0.0% | 0.0% | 0.0% | 4.8% | 23.8% | 61.9% | 0.0% | 4.8% | 9.5% |
| New Alyansh | 8 | 50.0% | 0.0% | 0.0% | 0.0% | 0.0% | 12.5% | 0.0% | 0.0% | 20.0% | 0.0% | 60.0% | 20.0% |
| Prince Rupert Rural | 25 | 20.0% | 4.0% | 0.0% | 0.0% | 0.0% | 0.0% | 8.0% | 14.3% | 71.4% | 0.0% | 4.8% | 9.5% |
| Prince Rupert City | 99 | 50.5% | 8.1% | 8.1% | 24.2% | 3.0% | 3.0% | 3.0% | 48.5% | 36.4% | 9.1% | 2.0% | 4.0% |
| Queen Charlotte | 11 | 27.3% | 9.1% | 9.1% | 0.0% | 0.0% | 0.0% | 0.0% | 11.1% | 77.8% | 11.1% | 0.0% | 0.0% |
| Smithers | 75 | 33.3% | 6.7% | 0.0% | 6.7% | 2.7% | 2.7% | 6.7% | 28.0% | 62.7% | 4.0% | 1.3% | 4.0% |
| Stewart | 35 | 11.4% | 5.7% | 0.0% | 2.9% | 0.0% | 5.7% | 31.4% | 8.8% | 61.8% | 0.0% | 11.8% | 17.6% |
| Terrace Rural | 80 | 25.0% | 5.0% | 3.8% | 2.5% | 3.8% | 5.0% | 7.5% | 14.5% | 73.7% | 1.3% | 6.6% | 3.9% |
| Terrace Municipal | 61 | 57.4% | 6.6% | 18.0% | 8.2% | 4.9% | 3.3% | 4.9% | 35.1% | 47.4% | 3.5% | 1.8% | 12.3% |
| **VANCOUVER SUB-DIVISION** | | | | | | | | | | | | | |
| Gibsons | 75 | 45.3% | 5.3% | 6.7% | 5.3% | 2.7% | 5.3% | 2.7% | 26.1% | 60.9% | 5.8% | 0.0% | 7.2% |
| Langley City | 253 | 79.4% | 4.7% | 4.3% | 8.7% | 2.4% | 1.6% | 4.7% | 55.6% | 33.3% | 7.9% | 0.4% | 2.8% |
| Langley Township | 422 | 65.4% | 4.5% | 3.3% | 4.0% | 5.2% | 5.9% | 8.3% | 42.2% | 40.1% | 11.0% | 1.4% | 5.3% |
| Maple Ridge Rural | 54 | 64.8% | 3.7% | 3.7% | 3.7% | 1.9% | 7.4% | 7.4% | 26.9% | 55.8% | 5.8% | 9.6% | 1.9% |
| Maple Ridge Municipal | 345 | 72.5% | 8.1% | 11.6% | 8.4% | 3.8% | 5.2% | 4.9% | 47.4% | 37.6% | 10.9% | 0.9% | 3.2% |
| Pemberton | 35 | 14.3% | 14.3% | 0.0% | 8.6% | 0.0% | 5.7% | 8.6% | 9.1% | 81.8% | 3.0% | 3.0% | 3.0% |
| Sechelt | 53 | 39.6% | 15.1% | 1.9% | 5.7% | 3.8% | 9.4% | 1.9% | 20.8% | 66.7% | 6.3% | 2.1% | 4.2% |
| Squamish Rural | 68 | 41.2% | 13.2% | 0.0% | 1.5% | 1.5% | 2.9% | 7.4% | 4.5% | 80.3% | 0.0% | 10.6% | 4.5% |
| Squamish Municipal | 107 | 46.7% | 11.2% | 7.5% | 3.7% | 5.6% | 2.8% | 3.7% | 32.0% | 46.6% | 8.7% | 2.9% | 9.7% |
| University | 73 | 64.4% | 12.3% | 24.7% | 2.7% | 4.1% | 0.0% | 5.5% | 43.8% | 47.9% | 4.1% | 0.0% | 4.1% |
| Vancouver-Bowen Island | 7 | 14.3% | 28.6% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 16.7% | 66.7% | 0.0% | 0.0% | 16.7% |
| Whistler | 59 | 32.2% | 5.1% | 6.8% | 8.5% | 3.4% | 5.1% | 11.9% | 19.6% | 66.1% | 1.8% | 5.4% | 7.1% |

| LOCATION | No. of Crashes | TYPES OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | | | | LOCATIONS OF CASUALTY MOTOR VEHICLE CRASHES, 1986 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | % Multiple Vehicle | % Motor-cycle | % Bike | % Pedes-trian | % Hit and Run | % Commercial Vehicle | % Out of Province Driver | % At Inter-section | % Between Inter-section | % "T" Junction | % Bridge | % Other |
| **VANCOUVER SUB-DIVISION** cont' | | | | | | | | | | | | | |
| White Rock | 112 | 81.3% | 12.5% | 8.9% | 12.5% | 3.6% | 6.3% | 8.9% | 60.0% | 31.8% | 3.6% | 0.0% | 4.5% |
| Deas Isle Freeway Patrol (Unit A) | 229 | 79.0% | 5.2% | 0.4% | 1.7% | 6.1% | 5.2% | 19.2% | 16.4% | 40.0% | 1.8% | 12.0% | 29.8% |
| Port Mann Freeway Patrol (Unit B) | 471 | 77.1% | 4.9% | 0.2% | 1.1% | 5.3% | 6.8% | 11.7% | 7.1% | 51.6% | 0.9% | 25.6% | 14.8% |
| **VICTORIA SUB-DIVISION** | | | | | | | | | | | | | |
| Chemainus | 36 | 47.2% | 5.6% | 5.6% | 0.0% | 0.0% | 5.6% | 8.3% | 37.5% | 40.6% | 15.6% | 3.1% | 3.1% |
| Colwood | 277 | 65.3% | 11.9% | 7.9% | 4.0% | 4.3% | 4.7% | 5.4% | 37.7% | 45.3% | 14.3% | 0.0% | 2.6% |
| Duncan | 163 | 57.7% | 6.1% | 8.0% | 10.4% | 1.8% | 6.1% | 4.3% | 51.6% | 37.4% | 6.5% | 1.3% | 3.2% |
| Duncan - North Cowichan | 83 | 67.5% | 4.8% | 8.4% | 6.0% | 1.2% | 3.6% | 7.2% | 45.0% | 32.5% | 16.3% | 2.5% | 3.8% |
| Gabriola Island | 28 | 39.3% | 14.3% | 3.6% | 3.6% | 7.1% | 3.6% | 3.6% | 41.7% | 58.3% | 0.0% | 0.0% | 0.0% |
| Ganges | 47 | 29.8% | 0.0% | 2.1% | 8.5% | 2.1% | 2.1% | 0.0% | 23.9% | 60.9% | 10.9% | 0.0% | 4.3% |
| Ladysmith | 71 | 43.7% | 2.8% | 0.0% | 4.2% | 1.4% | 0.0% | 1.4% | 26.5% | 57.4% | 2.9% | 2.9% | 10.3% |
| Lake Cowichan | 20 | 35.0% | 5.0% | 5.0% | 0.0% | 5.0% | 0.0% | 5.0% | 23.5% | 76.5% | 0.0% | 0.0% | 0.0% |
| Nanaimo Rural | 65 | 35.4% | 4.6% | 0.0% | 6.2% | 1.5% | 7.7% | 6.2% | 38.7% | 48.4% | 4.8% | 3.2% | 4.8% |
| Nanaimo Municipal | 499 | 75.4% | 6.4% | 7.2% | 7.8% | 2.8% | 2.4% | 4.6% | 57.4% | 30.4% | 7.7% | 0.2% | 4.3% |
| Pender Island | 6 | 16.7% | 33.3% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 100.0% | 0.0% | 0.0% | 0.0% |
| Shawnigan Lake | 87 | 41.4% | 8.0% | 1.1% | 3.4% | 1.1% | 3.4% | 3.4% | 21.4% | 69.0% | 4.8% | 3.6% | 1.2% |
| Sidney Rural | 8 | 75.0% | 12.5% | 25.0% | 0.0% | 0.0% | 0.0% | 12.5% | 37.5% | 62.5% | 0.0% | 0.0% | 0.0% |
| Sidney Municipal | 109 | 67.0% | 7.3% | 11.0% | 7.4% | 5.5% | 6.4% | 11.0% | 49.5% | 40.4% | 3.7% | 0.0% | 6.4% |
| Sooke | 93 | 31.2% | 11.8% | 0.0% | 6.5% | 2.2% | 1.1% | 8.6% | 13.4% | 65.9% | 11.0% | 2.4% | 7.3% |

# Canadian Criminal Code Traffic Charges by Police Jurisdiction. British Columbia, 1986.

# CANADIAN CRIMINAL CODE CHARGES IN BRITISH COLUMBIA, 1986. PERSONS CHARGED BY POLICE JURISDICTION.

This report deals with the number of persons charged under the Canadian Criminal Code in British Columbia in 1986 by police reporting jurisdiction. It includes the following:

- Total Persons Charged under the Canadian Criminal Code including Criminal Code Traffic Violations.
- Total Persons Charged under the Canadian Criminal Code Traffic Violations.
- Persons Charged under the Canadian Criminal Code for Traffic Violations Involving Drinking-Driving Offences.
- Persons charged with Canadian Criminal Code drinking-driving offences as a percentage of the total number of persons charged under the Canadian Criminal Code.

These data were supplied from the Statistics Canada Uniform Crime Report by the Policy Division of the Police Services Branch, Ministry of Attorney General. As these computer-based files are constantly being updated, any figures produced by that Division that contradict figures reported herein ought to be considered correct.

Revised October, 1987

Compiled by CounterAttack, a joint program of the Ministry of Attorney General and the Insurance Corporation of British Columbia.

Direct enquiries to: Dr. Bill Mercer
Research Director
(604) 660-2604

## Criminal Code Charges in British Columbia, 1986
## Persons Charged by Police Jurisdiction

| POLICE JURISDICTION | TOTAL CRIMINAL CODE INCLUDING TRAFFIC | CRIMINAL CODE TRAFFIC | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | TOTAL CRIMINAL CODE TRAFFIC | DRINKING DRIVING | | | | | | DRINKING DRIVING AS A PERCENT OF TOTAL CRIMINAL CODE INCLUDING TRAFFIC |
| | | | IMPAIRED OPERATION MOTOR VEH. CAUSING BODILY HARM | IMPAIRED OPERATION MOTOR VEH. CAUSING DEATH | IMPAIRED OPERATION MOTOR VEH. OR OVER .08 | FAIL/ REFUSE BREATH SAMPLE | FAIL/ REFUSE BLOOD SAMPLE | | |
| **Total for B.C.** | 73,118 | 15,807 | 151 | 24 | 13,817 | 535 | 20 | | 20% |
| **MUNICIPAL FORCES** | | | | | | | | | |
| Central Saanich | 105 | 34 | 0 | 0 | 30 | 0 | 0 | | 29% |
| Delta Municipal | 1,561 | 369 | 2 | 1 | 325 | 6 | 0 | | 21% |
| Esquimalt | 391 | 124 | 1 | 0 | 102 | 12 | 0 | | 29% |
| Matsqui | 1,056 | 232 | 0 | 1 | 191 | 15 | 0 | | 20% |
| Nelson City | 176 | 32 | 1 | 0 | 29 | 0 | 1 | | 18% |
| New Westminster | 1,163 | 188 | 9 | 0 | 133 | 0 | 0 | | 12% |
| Oak Bay | 162 | 18 | 0 | 0 | 15 | 0 | 0 | | 9% |
| Port Moody | 440 | 235 | 9 | 0 | 155 | 61 | 0 | | 51% |
| Saanich | 892 | 137 | 0 | 0 | 114 | 1 | 2 | | 13% |
| Vancouver City | 14,327 | 2,104 | 3 | 0 | 1,407 | 387 | 4 | | 13% |
| Victoria City | 2,360 | 214 | 21 | 2 | 151 | 2 | 0 | | 7% |
| West Vancouver | 821 | 228 | 0 | 0 | 223 | 0 | 0 | | 27% |
| **R. C. M. P.** | | | | | | | | | |
| AUTONOMOUS DET. | | | | | | | | | |
| Burnaby | 2,584 | 411 | 21 | 0 | 335 | 4 | 0 | | 14% |
| Coquitlam Rur. | 52 | 33 | 2 | 0 | 26 | 0 | 0 | | 54% |
| Coquitlam Mun. | 1,582 | 275 | 0 | 0 | 265 | 0 | 0 | | 17% |
| Port Coquitlam | 444 | 107 | 5 | 1 | 99 | 0 | 0 | | 24% |
| N. Vancouver City | 742 | 166 | 0 | 0 | 143 | 2 | 0 | | 20% |
| N. Vancouver Distr. | 765 | 189 | 0 | 0 | 173 | 0 | 0 | | 23% |
| Richmond Township | 1,258 | 343 | 2 | 2 | 320 | 1 | 1 | | 26% |
| Surrey Rur. | 60 | 53 | 0 | 0 | 51 | 0 | 0 | | 85% |
| Surrey Mun. | 4,649 | 1,030 | 2 | 1 | 972 | 5 | 1 | | 21% |
| CHILLIWACK S/D | | | | | | | | | |
| Abbotsford Rur. | 22 | 18 | 0 | 0 | 17 | 0 | 0 | | 77% |
| Abbotsford Mun. | 377 | 164 | 1 | 1 | 148 | 0 | 0 | | 40% |
| Agassiz | 269 | 90 | 0 | 0 | 84 | 0 | 0 | | 31% |
| Boston Bar | 88 | 45 | 0 | 0 | 37 | 0 | 0 | | 42% |
| Chilliwack Rur. | 153 | 23 | 0 | 0 | 19 | 0 | 0 | | 12% |
| Chilliwack Mun. | 1,349 | 267 | 2 | 0 | 252 | 0 | 0 | | 19% |
| Hope | 382 | 105 | 1 | 0 | 94 | 0 | 0 | | 25% |
| Mission Rur. | 46 | 23 | 2 | 0 | 20 | 0 | 0 | | 48% |
| Mission Mun. | 552 | 143 | 1 | 0 | 139 | 0 | 0 | | 25% |

## Criminal Code Charges in British Columbia, 1986
## Persons Charged by Police Jurisdiction

| | | CRIMINAL CODE TRAFFIC | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | DRINKING DRIVING | | | | | |
| POLICE JURISDICTION | TOTAL CRIMINAL CODE INCLUDING TRAFFIC | TOTAL CRIMINAL CODE TRAFFIC | IMPAIRED OPERATION MOTOR VEH. CAUSING BODILY HARM | IMPAIRED OPERATION MOTOR VEH. CAUSING DEATH | IMPAIRED OPERATION MOTOR VEH. OR OVER .08 | FAIL/ REFUSE BREATH SAMPLE | FAIL/ REFUSE BLOOD SAMPLE | DRINKING DRIVING AS A PERCENT OF TOTAL CRIMINAL CODE INCLUDING TRAFFIC |
| COURTENAY S/D | | | | | | | | |
| Alert Bay | 61 | 8 | 0 | 0 | 6 | 0 | 0 | 10% |
| Campbell River Rur. | 192 | 52 | 0 | 0 | 47 | 0 | 0 | 24% |
| Campbell River Mun. | 713 | 146 | 0 | 0 | 136 | 0 | 0 | 19% |
| Comox Mun. | 84 | 23 | 0 | 0 | 22 | 0 | 0 | 26% |
| Courtenay Rur. | 297 | 107 | 0 | 0 | 104 | 0 | 0 | 35% |
| Courtenay Mun. | 402 | 104 | 1 | 0 | 102 | 0 | 0 | 26% |
| Gold River | 26 | 4 | 0 | 0 | 4 | 0 | 0 | 15% |
| Parksville | 183 | 75 | 2 | 0 | 71 | 0 | 0 | 40% |
| Parksville Ext. | 149 | 24 | 1 | 0 | 22 | 0 | 0 | 15% |
| Port Alberni Rur. | 116 | 39 | 0 | 0 | 36 | 0 | 0 | 31% |
| Port Alberni Mun. | 804 | 131 | 0 | 0 | 125 | 0 | 0 | 16% |
| Port Alice | 38 | 4 | 0 | 0 | 4 | 0 | 0 | 11% |
| Port Hardy | 55 | 13 | 0 | 0 | 12 | 0 | 1 | 24% |
| Port Hardy Ext. | 175 | 23 | 0 | 0 | 22 | 0 | 0 | 13% |
| Port McNeill | 120 | 30 | 0 | 0 | 30 | 0 | 0 | 25% |
| Powell River Rur. | 82 | 26 | 0 | 0 | 22 | 0 | 0 | 27% |
| Powell River Mun. | 358 | 117 | 0 | 0 | 106 | 0 | 0 | 30% |
| Quadra Island | 36 | 6 | 0 | 0 | 4 | 0 | 0 | 11% |
| Sayward | 26 | 10 | 0 | 0 | 8 | 0 | 0 | 31% |
| Tahsis | 18 | 6 | 0 | 0 | 4 | 0 | 0 | 22% |
| Tofino | 86 | 14 | 1 | 0 | 9 | 0 | 0 | 12% |
| Ucluelet | 68 | 11 | 0 | 0 | 10 | 0 | 0 | 15% |
| Texada Island | 28 | 7 | 1 | 0 | 5 | 0 | 0 | 21% |
| KAMLOOPS S/D | | | | | | | | |
| Alexis Creek | 192 | 68 | 0 | 0 | 61 | 0 | 0 | 32% |
| Anahim Lake | 26 | 6 | 0 | 0 | 5 | 0 | 0 | 19% |
| Ashcroft | 129 | 45 | 0 | 0 | 42 | 0 | 0 | 33% |
| Barriere | 49 | 11 | 0 | 0 | 11 | 0 | 0 | 22% |
| Chase | 171 | 57 | 0 | 0 | 53 | 0 | 0 | 31% |
| Clearwater | 102 | 26 | 0 | 0 | 23 | 0 | 1 | 24% |
| Clinton | 32 | 7 | 0 | 0 | 5 | 0 | 0 | 16% |
| 100 Mile House | 222 | 62 | 1 | 0 | 56 | 0 | 0 | 26% |
| Kamloops Rur. | 40 | 27 | 0 | 0 | 27 | 0 | 0 | 68% |
| Kamloops Mun. | 1,826 | 409 | 14 | 0 | 379 | 2 | 1 | 22% |
| Lillooet | 152 | 47 | 0 | 0 | 43 | 0 | 1 | 29% |
| Logan Lake | 38 | 3 | 0 | 0 | 3 | 0 | 0 | 8% |

## Criminal Code Charges in British Columbia, 1986
## Persons Charged by Police Jurisdiction

| POLICE JURISDICTION | TOTAL CRIMINAL CODE INCLUDING TRAFFIC | CRIMINAL CODE TRAFFIC | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | TOTAL CRIMINAL CODE TRAFFIC | DRINKING DRIVING | | | | | DRINKING DRIVING AS A PERCENT OF TOTAL CRIMINAL CODE INCLUDING TRAFFIC |
| | | | IMPAIRED OPERATION MOTOR VEH. CAUSING BODILY HARM | IMPAIRED OPERATION MOTOR VEH. CAUSING DEATH | IMPAIRED OPERATION MOTOR VEH. OR OVER .08 | FAIL/ REFUSE BREATH SAMPLE | FAIL/ REFUSE BLOOD SAMPLE | |
| KAMLOOPS CONT' | | | | | | | | |
| Lytton | 140 | 50 | 1 | 0 | 47 | 0 | 0 | 34% |
| Merritt Rur. | 63 | 26 | 0 | 0 | 25 | 0 | 0 | 40% |
| Merritt Mun. | 211 | 43 | 0 | 0 | 42 | 0 | 0 | 20% |
| Spences Bridge | 13 | 4 | 0 | 0 | 3 | 0 | 0 | 23% |
| Valemount | 70 | 14 | 0 | 0 | 14 | 0 | 0 | 20% |
| Williams Lake Rur. | 124 | 31 | 0 | 0 | 28 | 0 | 0 | 23% |
| Williams Lake Mun. | 579 | 143 | 5 | 1 | 127 | 0 | 0 | 23% |
| KELOWNA S/D | | | | | | | | |
| Armstrong | 116 | 21 | 0 | 1 | 20 | 0 | 0 | 18% |
| Coldstream Ext. | 51 | 21 | 0 | 0 | 20 | 0 | 0 | 39% |
| Enderby | 96 | 33 | 0 | 0 | 31 | 0 | 0 | 32% |
| Falkland | 40 | 12 | 0 | 0 | 10 | 0 | 0 | 25% |
| Kelowna Rur. | 302 | 81 | 1 | 0 | 76 | 1 | 0 | 26% |
| Kelowna Mun. | 1,617 | 341 | 2 | 1 | 331 | 0 | 0 | 21% |
| Keremeos | 40 | 6 | 0 | 0 | 6 | 0 | 0 | 15% |
| Lumby | 58 | 17 | 0 | 0 | 17 | 0 | 0 | 29% |
| Oliver | 141 | 32 | 0 | 0 | 28 | 0 | 0 | 20% |
| Osoyoos | 87 | 14 | 0 | 0 | 13 | 0 | 0 | 15% |
| Penticton Rur. | 102 | 37 | 0 | 0 | 32 | 0 | 0 | 31% |
| Penticton Mun. | 825 | 123 | 0 | 0 | 116 | 0 | 0 | 14% |
| Princeton | 200 | 55 | 0 | 0 | 50 | 0 | 0 | 25% |
| Revelstoke | 30 | 15 | 0 | 0 | 14 | 0 | 0 | 47% |
| Revelstoke Ext. | 249 | 55 | 0 | 0 | 52 | 1 | 0 | 21% |
| Salmon Arm Rur. | 40 | 14 | 0 | 0 | 12 | 0 | 0 | 30% |
| Salmon Arm Mun. | 276 | 86 | 1 | 0 | 77 | 0 | 0 | 28% |
| Sicamous | 95 | 15 | 0 | 0 | 13 | 0 | 0 | 14% |
| Summerland Mun. | 48 | 18 | 0 | 0 | 17 | 0 | 0 | 35% |
| Vernon Rur. | 126 | 59 | 2 | 0 | 52 | 0 | 0 | 43% |
| Vernon Mun. | 1,001 | 263 | 4 | 0 | 250 | 0 | 0 | 25% |
| NELSON S/D | | | | | | | | |
| Castlegar Rur. | 19 | 9 | 1 | 0 | 7 | 0 | 0 | 42% |
| Castlegar Mun. | 128 | 37 | 0 | 0 | 34 | 0 | 0 | 27% |
| Cranbrook Rur. | 48 | 20 | 1 | 0 | 17 | 1 | 0 | 40% |
| Cranbrook Mun. | 545 | 87 | 0 | 0 | 79 | 0 | 0 | 14% |
| Crescent Valley | 25 | 3 | 0 | 0 | 2 | 0 | 0 | 8% |
| Creston | 290 | 85 | 0 | 0 | 82 | 0 | 0 | 28% |

## Criminal Code Charges in British Columbia, 1986
## Persons Charged by Police Jurisdiction

| POLICE JURISDICTION | TOTAL CRIMINAL CODE INCLUDING TRAFFIC | CRIMINAL CODE TRAFFIC | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | TOTAL CRIMINAL CODE TRAFFIC | DRINKING DRIVING | | | | | DRINKING DRIVING AS A PERCENT OF TOTAL CRIMINAL CODE INCLUDING TRAFFIC |
| | | | IMPAIRED OPERATION MOTOR VEH. CAUSING BODILY HARM | IMPAIRED OPERATION MOTOR VEH. CAUSING DEATH | IMPAIRED OPERATION MOTOR VEH. OR OVER .08 | FAIL/ REFUSE BREATH SAMPLE | FAIL/ REFUSE BLOOD SAMPLE | |
| NELSON CONT' | | | | | | | | |
| Elkford | 62 | 6 | 0 | 0 | 4 | 1 | 0 | 8% |
| Fernie | 59 | 27 | 0 | 0 | 25 | 0 | 0 | 42% |
| Fernie Ext. | 125 | 27 | 0 | 0 | 25 | 0 | 0 | 20% |
| Field | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0% |
| Fruitvale | 80 | 5 | 0 | 0 | 5 | 0 | 0 | 6% |
| Golden | 164 | 51 | 0 | 0 | 47 | 0 | 0 | 29% |
| Grand Forks | 165 | 69 | 0 | 0 | 67 | 0 | 0 | 41% |
| Invermere | 86 | 28 | 0 | 0 | 25 | 0 | 0 | 29% |
| Kaslo | 30 | 3 | 0 | 0 | 2 | 0 | 0 | 7% |
| Kimberley Rur. | 34 | 15 | 0 | 0 | 15 | 0 | 0 | 44% |
| Kimberley Mun. | 141 | 55 | 0 | 0 | 55 | 0 | 0 | 39% |
| Midway | 35 | 9 | 0 | 0 | 7 | 0 | 0 | 20% |
| Nakusp | 30 | 3 | 0 | 0 | 2 | 0 | 0 | 7% |
| Nelson | 27 | 8 | 0 | 0 | 6 | 0 | 0 | 22% |
| New Denver | 5 | 1 | 0 | 0 | 1 | 0 | 0 | 20% |
| Radium | 18 | 1 | 0 | 0 | 1 | 0 | 0 | 6% |
| Rossland | 65 | 11 | 0 | 0 | 11 | 0 | 0 | 17% |
| Salmo | 103 | 27 | 0 | 0 | 27 | 0 | 0 | 26% |
| Sparwood | 82 | 16 | 0 | 0 | 15 | 1 | 0 | 20% |
| Trail Rur. | 19 | 5 | 0 | 0 | 5 | 0 | 0 | 26% |
| Trail Mun. | 179 | 29 | 0 | 0 | 27 | 0 | 0 | 15% |
| PRINCE GEORGE S/D | | | | | | | | |
| Burns Lake | 291 | 56 | 0 | 0 | 48 | 5 | 0 | 18% |
| Chetwynd | 181 | 69 | 0 | 1 | 66 | 1 | 0 | 38% |
| Dawson Creek Rur. | 92 | 28 | 0 | 0 | 25 | 0 | 1 | 28% |
| Dawson Creek Mun. | 581 | 141 | 0 | 0 | 126 | 6 | 0 | 23% |
| Fort Nelson | 199 | 63 | 0 | 0 | 57 | 0 | 0 | 29% |
| Fort St. James | 271 | 65 | 2 | 0 | 59 | 0 | 0 | 23% |
| Fort St. John Rur. | 100 | 35 | 1 | 1 | 26 | 0 | 0 | 28% |
| Fort St. John Mun. | 559 | 105 | 5 | 0 | 89 | 0 | 0 | 17% |
| Fraser Lake | 93 | 22 | 1 | 1 | 17 | 0 | 0 | 20% |
| Hudsons Hope | 45 | 11 | 0 | 0 | 11 | 0 | 0 | 24% |
| Mackenzie Rur. | 72 | 5 | 0 | 0 | 5 | 0 | 0 | 7% |
| Mackenzie Mun. | 168 | 35 | 0 | 0 | 33 | 0 | 0 | 20% |
| McBride | 12 | 1 | 0 | 0 | 1 | 0 | 0 | 8% |
| Prince George Rur. | 128 | 32 | 0 | 0 | 27 | 0 | 0 | 21% |
| Prince George City | 2,692 | 552 | 1 | 1 | 508 | 0 | 0 | 19% |

## Criminal Code Charges in British Columbia, 1986
## Persons Charged by Police Jurisdiction

| POLICE JURISDICTION | TOTAL CRIMINAL CODE INCLUDING TRAFFIC | CRIMINAL CODE TRAFFIC | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | TOTAL CRIMINAL CODE TRAFFIC | DRINKING DRIVING | | | | | DRINKING DRIVING AS A PERCENT OF TOTAL CRIMINAL CODE INCLUDING TRAFFIC |
| | | | IMPAIRED OPERATION MOTOR VEH. CAUSING BODILY HARM | IMPAIRED OPERATION MOTOR VEH. CAUSING DEATH | IMPAIRED OPERATION MOTOR VEH. OR OVER .08 | FAIL/ REFUSE BREATH SAMPLE | FAIL/ REFUSE BLOOD SAMPLE | |
| PRINCE GEORGE CONT' | | | | | | | | |
| Quesnel Rur. | 165 | 40 | 1 | 1 | 37 | 0 | 0 | 24% |
| Quesnel Mun. | 398 | 99 | 2 | 1 | 89 | 0 | 1 | 23% |
| Tumbler Ridge | 78 | 13 | 0 | 0 | 12 | 0 | 0 | 15% |
| Vanderhoof | 347 | 120 | 1 | 0 | 112 | 0 | 0 | 33% |
| Watson Lake, Teslin | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| Wells | 40 | 9 | 0 | 0 | 8 | 0 | 0 | 20% |
| PRINCE RUPERT S/D | | | | | | | | |
| Atlin | 19 | 2 | 0 | 0 | 2 | 0 | 0 | 11% |
| Bella Bella | 72 | 4 | 0 | 0 | 3 | 0 | 0 | 4% |
| Bella Coola | 77 | 14 | 0 | 0 | 11 | 0 | 0 | 14% |
| Cassiar | 65 | 10 | 0 | 0 | 8 | 0 | 0 | 12% |
| Dease Lake | 59 | 2 | 0 | 0 | 1 | 0 | 0 | 2% |
| Granisle | 28 | 7 | 0 | 0 | 7 | 0 | 0 | 25% |
| Hazelton | 164 | 58 | 0 | 0 | 55 | 1 | 0 | 34% |
| Houston | 109 | 21 | 0 | 0 | 18 | 0 | 0 | 17% |
| Kitimat Rur. | 30 | 7 | 0 | 0 | 7 | 0 | 0 | 23% |
| Kitimat Mun. | 237 | 68 | 1 | 0 | 64 | 0 | 0 | 27% |
| Masset | 134 | 27 | 0 | 0 | 24 | 0 | 0 | 18% |
| New Aiyansh | 36 | 7 | 0 | 0 | 7 | 0 | 0 | 19% |
| Prince Rupert Rur. | 45 | 8 | 0 | 0 | 4 | 1 | 0 | 11% |
| Prince Rupert City | 620 | 117 | 0 | 0 | 106 | 7 | 2 | 19% |
| Queen Charlotte | 105 | 16 | 0 | 0 | 15 | 0 | 0 | 14% |
| Smithers | 425 | 198 | 0 | 0 | 171 | 0 | 1 | 40% |
| Stewart | 29 | 7 | 1 | 0 | 4 | 0 | 0 | 17% |
| Terrace Rur. | 160 | 39 | 1 | 1 | 36 | 0 | 0 | 24% |
| Terrace Mun. | 686 | 129 | 0 | 0 | 123 | 1 | 0 | 18% |
| VANCOUVER S/D | | | | | | | | |
| Gibsons | 260 | 77 | 1 | 0 | 72 | 2 | 0 | 29% |
| Langley City | 510 | 78 | 0 | 0 | 62 | 0 | 1 | 12% |
| Langley Township | 795 | 173 | 0 | 1 | 144 | 0 | 1 | 18% |
| Maple Ridge Rur. | 39 | 4 | 0 | 0 | 3 | 0 | 0 | 8% |
| Maple Ridge Mun. | 922 | 267 | 1 | 0 | 258 | 0 | 0 | 28% |
| Pemberton | 112 | 35 | 1 | 0 | 31 | 0 | 0 | 29% |
| Pitt Meadows Ext. | 93 | 31 | 1 | 0 | 28 | 0 | 0 | 31% |

## Criminal Code Charges in British Columbia, 1986
## Persons Charged by Police Jurisdiction

| POLICE JURISDICTION | TOTAL CRIMINAL CODE INCLUDING TRAFFIC | CRIMINAL CODE TRAFFIC | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | TOTAL CRIMINAL CODE TRAFFIC | DRINKING DRIVING | | | | | DRINKING DRIVING AS A PERCENT OF TOTAL CRIMINAL CODE INCLUDING TRAFFIC |
| | | | IMPAIRED OPERATION MOTOR VEH. CAUSING BODILY HARM | IMPAIRED OPERATION MOTOR VEH. CAUSING DEATH | IMPAIRED OPERATION MOTOR VEH. OR OVER .08 | FAIL/ REFUSE BREATH SAMPLE | FAIL/ REFUSE BLOOD SAMPLE | |
| **VANCOUVER CONT'** | | | | | | | | |
| Sechelt | 268 | 62 | 1 | 0 | 59 | 0 | 0 | 22% |
| Squamish Rur. | 43 | 20 | 1 | 0 | 12 | 0 | 0 | 30% |
| Squamish Mun. | 313 | 74 | 0 | 0 | 65 | 0 | 0 | 21% |
| University | 75 | 28 | 0 | 0 | 24 | 0 | 0 | 32% |
| Vancouver-Bowen Is. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| Whistler | 153 | 76 | 0 | 0 | 74 | 0 | 0 | 48% |
| White Rock | 295 | 87 | 0 | 0 | 77 | 0 | 0 | 26% |
| Deas Isle Freeway (Unit A) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| Port Mann Freeway (Unit B) | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| **VICTORIA S/D** | | | | | | | | |
| Chemainus/North Cowichan | 86 | 25 | 0 | 0 | 24 | 0 | 0 | 28% |
| Colwood | 620 | 208 | 0 | 0 | 183 | 0 | 0 | 30% |
| Duncan | 441 | 110 | 1 | 2 | 98 | 3 | 0 | 24% |
| Duncan/N. Cowichan | 196 | 52 | 0 | 0 | 45 | 2 | 0 | 24% |
| Gabriola Island | 21 | 7 | 1 | 0 | 4 | 0 | 0 | 24% |
| Ganges | 88 | 18 | 0 | 0 | 16 | 0 | 0 | 18% |
| Ladysmith | 150 | 42 | 1 | 0 | 39 | 0 | 0 | 27% |
| Lake Cowichan | 57 | 15 | 0 | 0 | 14 | 0 | 0 | 25% |
| Nanaimo Rur. | 118 | 34 | 0 | 0 | 31 | 1 | 0 | 27% |
| Nanaimo Mun. | 2,070 | 535 | 1 | 1 | 512 | 1 | 0 | 25% |
| North Saanich Ext. | 72 | 36 | 0 | 0 | 34 | 1 | 0 | 49% |
| Pender Island | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0% |
| Shawnigan Lake | 75 | 19 | 0 | 1 | 15 | 0 | 0 | 21% |
| Sidney Rur. | 18 | 4 | 0 | 0 | 3 | 0 | 0 | 17% |
| Sidney Mun. | 154 | 41 | 0 | 0 | 39 | 0 | 0 | 25% |
| Sooke | 228 | 27 | 0 | 0 | 25 | 0 | 0 | 11% |

# SECTION 5

## THE COUNTERATTACK PROGRAM

CounterAttack Program Overview

CounterAttack Police Roadcheck Statistics.
Spring, 1987 and Christmas 1987/88

Drinking-driving Media Coverage, 1987.

CounterAttack Research Data Sources:
Traffic Accident Report Forms (MV104)

CounterAttack Program Evaluation Guide for Community Leaders.

Traffic Safety in British Columbia:
More than Drinking Driving CounterAttack.

# CounterAttack Program Overview

## CounterAttack: British Columbia's Anti-Drinking Driving Program

Although many people may not be aware of it, Driving While Impaired is the single most serious and costly criminal activity in British Columbia. Consider the following - in an average year in B.C. about 110 people are murdered, but about 250 people are killed in drinking driving accidents. Further, in an average year in B.C. there are about 450 woundings, yet about 7,200 people are injured in drinking driving accidents. The impact of this crime on the justice system is staggering: about 22,000 persons are charged under the Canadian Criminal Code every year in B.C. at a cost of at least 22 million dollars, and these charges comprise a third of the entire Criminal Code case burden before the courts.

CounterAttack is a crime prevention program aimed directly at reducing drinking driving and the accidents associated with it. Started in 1977, the program is co-funded by the Ministry of Attorney General and the Insurance Corporation of B.C., and has a combined budget of $600,000. Essentially, the program takes three inter-related forms: visible enforcement, public education, and research and evaluation.

### Visible Enforcement

Research has shown that visible enforcement is a powerful tool in crime prevention. If people perceive a strong and immediate police presence, they are less likely to commit a crime. Using this principle, the CounterAttack program has assisted the police in their drinking driving "blitz" activities by supplying them with 14 mobile breath testing vans (BATmobiles), by producing media materials to help publicize these blitzes, and by helping the police to co-ordinate and evaluate the blitzes. As a direct result of these blitzes, the level of drinking driving accidents is at its lowest during the Christmas and New Year's period.

In addition to the Christmas roadcheck campaigns which have been held since 1977, the Program has been co-ordinating a community-based Spring roacheck campaign for the past three years. The reason for this latter campaign is that CounterAttack research has identified this period as one of the highest periods of the year for alcohol-related traffic accidents.

### Public Information

Public education is a year-round activity for the CounterAttack Program. Research identifies target populations and television and radio messages are produced and broadcast throughout the year, using a proportion of the beer and wine industry's advertising budget to purchase prime time for airing these messages. Brochures and posters parallel the media messages and are distributed throughout the province to schools, libraries, the police, liquor stores, and a wide range of special interest groups including the B.C. Medical Association, B.C. Automobile Association, Mothers Against Drunk Driving, and the general public. Further, the Program supplies all schools in the province with drinking driving educational materials in the form of lesson plans, slide presentations, films, videotapes, and so on.

The CounterAttack Program also encourages public participation through the co-ordination of community-based CounterAttack groups, which are brought together at local and province-wide conferences for both adults and students.

Finally, CounterAttack has produced a multi-media shopping centre display to bring the Program's messages to the community level. This display, which was a part of EXPO 86, travels across the province for six months of the year, while smaller displays on drinking-driving are available to the public year-round.

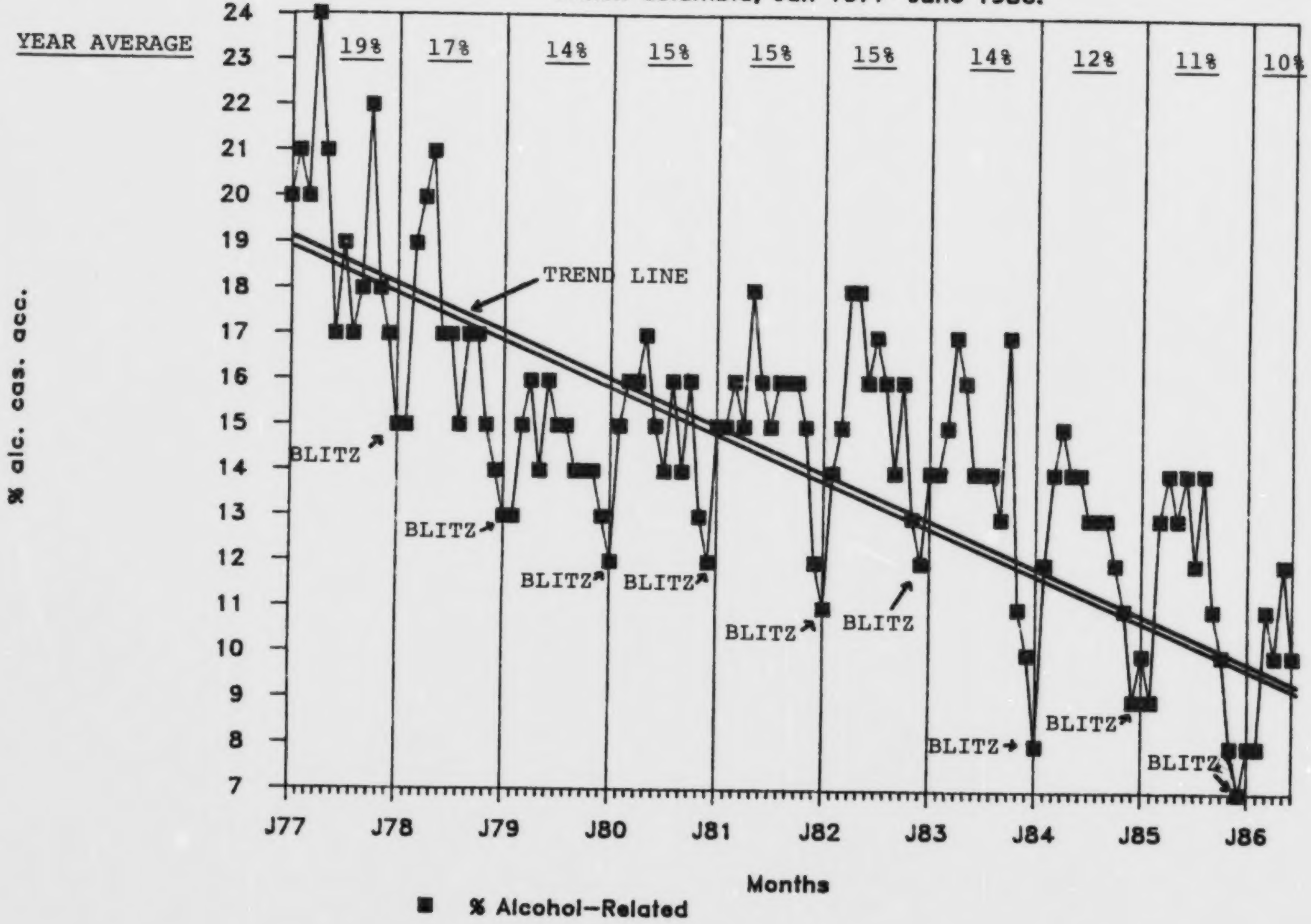
## Research and Evaluation

An absolutely essential component of any crime prevention program is the constant evaluation and improvement of that program through research. One example of CounterAttack's research aimed at improving public information stems from a B.C.-wide survey done by the program that found that people were not aware that the penalties for Driving While Impaired could be severe. Based on this, and using the notion that for a law to have a deterrent effect the penalties must be known, CounterAttack produced television and radio messages telling the public of these penalties. Research findings also directed the public information messages concerning the dangers of riding with a drinking driver and that 75% of the victims of drinking drivers are in the drinking drivers' vehicles.

Overall, the research suggests that since the program began in 1977, the proportion of alcohol-related casualty accidents has been kept to about 10% less than what would have been expected without the program. Each year this translates into a savings of about 30 lives, 850 injuries, and $10 million dollars which would otherwise be paid out in insurance, hospital, and justice system costs. In short, this is a very good return on a $600,000 investment.

% Alcohol–Related Casualty Accidents

British Columbia, Jan 1977–June 1986.



## Current Situation

May, 1987 marks the 10th anniversary of British Columbia's CounterAttack program. Since the inception of CounterAttack in 1977, the percentage of traffic accidents causing injury or death where alcohol was judged to be the most important contributing factor has dropped from about 20% to about 10% - a 50% decrease.

In 1987, CounterAttack will continue to serve on traffic safety committees, to assist the police in their drinking-driving roadchecks, to produce and distribute public education materials and mass media messages, and to research and evaluate traffic safety issues. New initiatives include: the production of new television and radio messages; the production of new print materials and posters; a conference for auxilliary/reserve police on program promotion skills; implementation and evaluation of field testing of new Approved Screening Devices in three R.C.M.P. subdivisions; introduction of three CounterAttack station wagons to replace retired BATmobiles; 4 regional and 1 provincial Youth Leadership conferences; and the production of an expanded data base to allow the analyses of traffic accident reports, drivers'records, and coroner's records.

For more information on the CounterAttack Program, please contact:

Police Services Branch,
Ministry of Attorney General
207 - 815 Hornby Street
Vancouver, B.C.   V6Z 2E6
(604) 660-2604

# CounterAttack Police Roadcheck Statistics.
# Spring, 1987 and Christmas 1987/88

## CounterAttack Police Roadcheck Statistics.

### Spring CounterAttack, 1987.

Because the spring period has been identified as a time of year with a high proportion of alcohol-related traffic accidents, the CounterAttack Program of the Ministry of Attorney General, the Insurance Corporation of British Columbia and the police throughout the province decided to mount a Spring CounterAttack roadcheck campaign between April 13th and May 4th, 1987.

Tables 1 and 2 below summarize the local and provincial enforcement statistics. In total, 195,816 vehicles were checked, which was only 4% fewer per week than during Christmas CounterAttack 1986/87. Concerning drinking-driving charges laid, 770 Criminal Code driving while impaired charges were laid (a 44% increase in the proportion of charges/vehicles checked when compared to Christmas CounterAttack 1986/87) and 1,037 24-hour licence suspensions were issued (a 33% increase in charges/ vehicles checked over Christmas).

The campaign utilized over 12,000 police hours on roadchecks.

Table 1

APRIL - MAY 1987 COUNTERATTACK ROADCHECK CAMPAIGN

Independent Police Force Data

| LOCATION | A. FATAL COLL. | B. PERSONS KILLED | C. INJURY COLL. | D. PERSONS INJURED | E. PROPERTY DAMAGE COLL. | F. TOTAL CHARGES EXCLUDE G,I | G. DWI CHARGES | H. ALCOHOL RELATED COLL. | I. 24 HR.L PROHIB. | J. ROAD CHECK HOURS | K. PERSON HOURS | L. VEHICLES CHECKED | M. WRITTEN WARNINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INDEPENDENT FORCES | | | | | | | | | | | | | |
| Central Saanich | 0 | 0 | 4 | 7 | 11 | 122 | 5 | 3 | 5 | 5 | 5 | 790 | 47 |
| Delta | 1 | 1 | 14 | 25 | 41 | 221 | 4 | 5 | 13 | 25 | 49 | 3,373 | - |
| Esquimalt | 1 | 1 | 1 | 1 | 3 | 9 | 3 | 0 | 13 | 13 | 40 | 590 | 27 |
| Matsqui | 0 | 0 | 22 | - | 76 | 39 | 17 | - | 24 | 12 | 36 | 350 | 5 |
| Nelson City | 0 | 0 | 1 | 4 | 12 | 25 | 1 | 2 | 5 | 10 | 23 | 1,079 | 22 |
| New Westminster | 0 | 0 | - | - | - | 120 | 1 | - | 13 | 55 | 110 | 11,157 | 84 |
| Oak Bay | 0 | 0 | 3 | 1 | 17 | 14 | 0 | 0 | 4 | 12 | 37 | 1,167 | 1 |
| Port Moody | 0 | 0 | 9 | 13 | 18 | 147 | 4 | 0 | 12 | 28 | 56 | 1,360 | 198 |
| Saanich | 0 | 0 | 27 | 38 | 83 | 224 | 5 | 3 | 18 | 49 | 160 | 6,014 | 218 |
| Vancouver | 0 | 0 | 194 | 243 | 1,311 | - | 9 | 15 | 16 | - | - | 11,000 | - |
| Victoria | 1 | 1 | 45 | 62 | 166 | 364 | 12 | 10 | 21 | 15 | 20 | 2,425 | 53 |
| W. Vancouver | 0 | 0 | 5 | 5 | 92 | - | 18 | 0 | 26 | - | - | 2,100 | 31 |
| TOTAL | 3 | 3 | 325 | 399 | 1,830 | 1,285 | 79 | 38 | 170 | 224 | 536 | 41,405 | 686 |

**Note:** "-" indicates no return for those forces. Consequently column totals for containing "-" are under-estimations.

### Table 2
### APRIL - MAY 1987 COUNTERATTACK ROADCHECK CAMPAIGN
### R.C.M.P. Data, Independent Forces Total, and Provincial Total

| LOCATION | A. FATAL COLL. | B. PERSONS KILLED | C. INJURY COLL. | D. PERSONS INJURED | E. PROPERTY DAMAGE COLL. | F. TOTAL CHARGES EXCLUDE G,I | G. DWI CHARGES | H. ALCOHOL RELATED COLL. | I. 24 HR. PROHIB. | J. ROAD CHECK HOURS | K. PERSON HOURS | L. VEHICLES CHECKED | M. WRITTEN WARNINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R.C.M.P. | | | | | | | | | | | | | |
| DISTRICT 1 | | | | | | | | | | | | | |
| Burnaby | 2 | 3 | 92 | 109 | 282 | 1,752 | 44 | 12 | 38 | 124 | 134 | 7,312 | 380 |
| Chilliwack | 1 | 1 | 30 | 41 | 109 | 2,273 | 43 | 10 | 53 | 250 | 406 | 15,744 | 1,430 |
| Coquitlam | 0 | 0 | 52 | 68 | 152 | 1,211 | 33 | 9 | 50 | 84 | 262 | 5,900 | 327 |
| Courtenay | 3 | 4 | 63 | 90 | 274 | 2,912 | 59 | 29 | 102 | 3,435 | 2,554 | 17,040 | 1,160 |
| North Van. | 0 | 0 | 33 | 37 | 204 | 770 | 8 | 6 | 8 | 61 | 99 | 1,771 | 218 |
| Richmond | 0 | 0 | 47 | 49 | 68 | 1,071 | 18 | 14 | 38 | 38 | 133 | 2,110 | 286 |
| Surrey | 2 | 3 | 145 | 203 | 358 | 292 | 52 | 10 | 35 | 181 | 287 | 3,540 | 55 |
| KAMLOOPS S/D | 5 | 6 | 74 | 106 | 253 | 2,781 | 63 | 19 | 77 | 405 | 632 | 11,624 | 1,842 |
| KELOWNA S/D | 5 | 5 | 96 | 143 | 314 | 3,189 | 72 | 31 | 63 | 449 | 781 | 16,597 | 1,417 |
| NELSON S/D | 0 | 0 | 36 | 51 | 181 | 1,324 | 37 | 15 | 60 | 557 | 2,709 | 13,774 | 1,844 |
| PRINCE GEORGE S/D | 3 | 3 | 53 | 72 | 264 | 3,493 | 83 | 24 | 66 | 728 | 1,224 | 16,701 | 1,969 |
| PRINCE RUPERT S/D | 2 | 2 | 21 | 30 | 83 | 729 | 58 | 11 | 48 | 263 | 426 | 9,094 | 753 |
| VANCOUVER S/D | 2 | 2 | 77 | 138 | 368 | 5,347 | 66 | 29 | 113 | 805 | 1,249 | 21,427 | 1,514 |
| VICTORIA S/D | 3 | 3 | 57 | 83 | 218 | 2,272 | 55 | 24 | 116 | 351 | 751 | 11,777 | 802 |
| RCMP TOTAL | 28 | 32 | 876 | 1,220 | 3,128 | 29,416 | 691 | 243 | 867 | 7,731 | 11,647 | 154,411 | 13,997 |
| INDEPENDENT TOTAL | 3 | 3 | 325 | 399 | 1,830 | 1,285 | 79 | 38 | 170 | 224 | 536 | 41,405 | 686 |
| PROVINCIAL TOTAL | 31 | 35 | 1,201 | 1,614 | 4,958 | 30,701 | 770 | 280 | 1,037 | 7,945 | 12,181 | 195,816 | 14,697 |

## CounterAttack Police Roadcheck Statistics.

### Christmas CounterAttack, 1987/1988

The 1987-88 police roadcheck campaign was the eleventh Christmas CounterAttack and was the best on record:

### Christmas CounterAttack a Record-breaker

"We have never had a more successful Christmas CounterAttack" announced the Hon. Brian Smith, Attorney General and Minister responsible for the program. For the fourth year in a row the month-long Christmas CounterAttack police roadcheck campaign has broken records with more vehicles checked and proportionally fewer drinking-driving charges having to be laid. Between December 8th and January 3rd, police throughout B.C. checked over 340,000 vehicles in about 4,800 roadcheck hours and only laid 880 drinking-driving charges - an increase of 25% in vehicles and a decrease of 4% in the number of charges/vehicle stopped over last year's figures.

"The people of British Columbia should be proud of the fact that during the eleven years of the CounterAttack Program we have all worked together to reduce the percentage of alcohol-related casualty traffic accidents by half, and this Christmas, public support was at an unprecedented level" Smith said. Private citizens, CounterAttack school groups and even large corporations all joined together to get across the message not to drink and drive. For example, in addition to the invaluable support of the Insurance Corporation of B.C., the Ministry of Attorney General's long-time partner in CounterAttack, B.C. Transit and the White Spot restaurants also ran major anti-drinking driving campaigns over the Christmas period.

The Attorney General added "if we can all work together throughout the year like we did in Christmas CounterAttack, we can look foward to another record year in 1988."

The following two tables summarize the local and provincial enforcement statistics.

Table 1
DECEMBER, 1987 - JANUARY, 1988 COUNTERATTACK ROADCHECK CAMPAIGN
Independent Police Force Data

| LOCATION | A. FATAL COLL. | B. PERSONS KILLED | C. INJURY COLL. | D. PERSONS INJURED | E. PROPERTY DAMAGE COLL. | F. TOTAL CHARGES EXCLUDE G,I | G. DWI CHARGES | H. ALCOHOL RELATED COLL. | I. 24 HR. PROHIB. | J. ROAD CHECK HOURS | K. PERSON HOURS | L. VEHICLES CHECKED | M. WRITTEN WARNINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INDEPENDENT FORCES | | | | | | | | | | | | | |
| Central Saanich | 1 | 1 | 4 | 5 | 18 | 48 | 2 | 0 | 3 | 1 | 4 | 50 | 1 |
| Delta | 0 | 0 | 19 | 26 | 72 | 526 | 21 | 10 | 38 | 27 | 76 | 4,968 | 0 |
| Esquimalt | 0 | 0 | 2 | 3 | 22 | 15 | 3 | 2 | 13 | 6 | 33 | 1,035 | 6 |
| Matsqui | 0 | 0 | 40 | - | 85 | 99 | 11 | - | 22 | 24 | 120 | 1,800 | 26 |
| Nelson City | 0 | 0 | 1 | 1 | 20 | 8 | 2 | 3 | 5 | 15 | 42 | 1,388 | 18 |
| New Westminster | 0 | 0 | 26 | 43 | 91 | 475 | 19 | 6 | 38 | 65 | 411 | 15,403 | 89 |
| Oak Bay | 0 | 0 | 3 | 3 | 15 | 44 | 2 | 1 | 4 | 20 | 61 | 1,775 | 15 |
| Port Moody | 0 | 0 | 7 | 9 | 45 | 3 | 4 | 0 | 12 | 6 | 15 | 910 | 15 |
| Saanich | 0 | 0 | 25 | 37 | 182 | 46 | 4 | 5 | 6 | 20 | 62 | 2,116 | 81 |
| Vancouver | 2 | 2 | 638 | 797 | 3,552 | 406 | 119 | - | 84 | 130 | 2,000 | 68,100 | 331 |
| Victoria | 1 | 1 | 50 | 57 | 244 | 1,483 | 10 | 8 | 55 | 55 | 110 | 1,150 | 46 |
| W. Vancouver | 0 | 0 | 26 | 29 | 131 | 496 | 15 | - | 31 | - | - | - | - |
| TOTAL | 4 | 4 | 841 | 1,010 | 4,477 | 3,649 | 212 | 35 | 311 | 369 | 2,934 | 98,695 | 628 |

**Note:** "-" indicates no return for those forces. Consequently column totals for containing "-" are under-estimations.

Table 2

DECEMBER, 1987 - JANUARY, 1988 COUNTERATTACK ROADCHECK CAMPAIGN

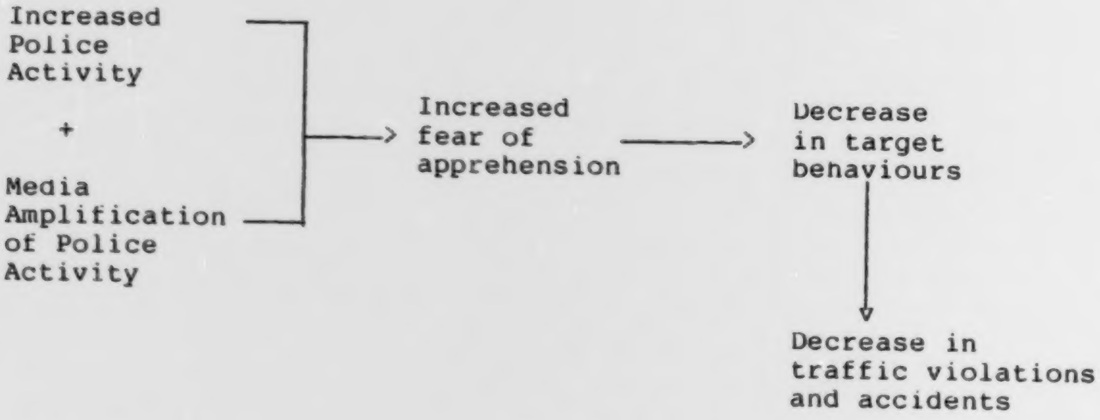
R.C.M.P. Data, Independent Forces Total, and Provincial Total

| LOCATION | A. FATAL COLL. | B. PERSONS KILLED | C. INJURY COLL. | D. PERSONS INJURED | E. PROPERTY DAMAGE COLL. | F. TOTAL CHARGES EXCLUDE G,I | G. DWI CHARGES | H. ALCOHOL RELATED COLL. | I. 24 HR. PROHIB. | J. ROAD CHECK HOURS | K. PERSON HOURS | L. VEHICLES CHECKED | M. WRITTEN WARNINGS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| R.C.M.P. | | | | | | | | | | | | | |
| DISTRICT 1 | | | | | | | | | | | | | |
| Burnaby | 0 | 0 | 78 | 103 | 341 | 1,060 | 17 | 19 | 30 | 72 | 219 | 4,168 | 541 |
| Chilliwack | 3 | 3 | 46 | 65 | 274 | 1,751 | 44 | 12 | 57 | 327 | 542 | 18,466 | 2,095 |
| Coquitlam | 2 | 2 | 62 | 99 | 302 | 1,210 | 30 | 5 | 56 | 96 | 390 | 6,100 | 157 |
| Courtenay | 3 | 3 | 68 | 98 | 344 | 2,560 | 57 | 33 | 106 | 372 | 976 | 27,197 | 961 |
| North Van. | 0 | 0 | 50 | 65 | 289 | 751 | 16 | 13 | 50 | 35 | 105 | 4,850 | 524 |
| Richmond | 0 | 0 | 84 | 112 | 244 | 925 | 34 | 16 | 83 | 52 | 244 | 8,200 | 780 |
| Surrey | 1 | 1 | 173 | 246 | 410 | 1,884 | 45 | 9 | 74 | 43 | 218 | 5,246 | 33 |
| KAMLOOPS S/D | 3 | 3 | 120 | 166 | 403 | 2,042 | 64 | 42 | 93 | 447 | 876 | 13,939 | 1,575 |
| KELOWNA S/D | 4 | 4 | 123 | 221 | 681 | 3,227 | 61 | 39 | 113 | 689 | 1,325 | 29,097 | 1,852 |
| NELSON S/D | 4 | 5 | 53 | 97 | 361 | 1,621 | 33 | 26 | 81 | 578 | 951 | 27,364 | 2,007 |
| PRINCE GEORGE S/D | 2 | 2 | 99 | 128 | 533 | 3,376 | 77 | 31 | 130 | 541 | 1,325 | 27,987 | 2,897 |
| PRINCE RUPERT S/D | 2 | 3 | 27 | 50 | 240 | 701 | 56 | 14 | 54 | 269 | 484 | 11,917 | 907 |
| VANCOUVER S/D | 0 | 0 | 145 | 198 | 652 | 4,124 | 74 | 43 | 146 | 601 | 1,191 | 38,510 | 1,909 |
| VICTORIA S/D | 1 | 1 | 119 | 165 | 380 | 1,695 | 67 | 33 | 93 | 329 | 830 | 21,957 | 1,268 |
| | | | | | | | | | | | | | |
| RCMP TOTAL | 25 | 27 | 1,247 | 1,813 | 5,454 | 26,927 | 675 | 335 | 1,166 | 4,451 | 9,676 | 244,998 | 17,506 |
| INDEPENDENT TOTAL | 4 | 4 | 841 | 1,010 | 4,477 | 3,649 | 212 | 35 | 311 | 369 | 2,934 | 98,695 | 628 |
| | | | | | | | | | | | | | |
| PROVINCIAL TOTAL | 29 | 31 | 2,088 | 2,823 | 9,931 | 30,576 | 887 | 370 | 1,477 | 4,820 | 12,610 | 343,693 | 18,134 |

# Drinking-driving Media Coverage, 1987.

## CounterAttack and the Media: Teamwork to Reduce Drinking Driving.

There is good evidence to show that a police traffic enforcement campaign can be effective in reducing target crimes if and only if the public is made aware of the campaign (Mercer, 1985, 1986a). The mechanism is:


Increased Police Activity
+
Media Amplification of Police Activity
Increased fear of apprehension
Decrease in target behaviours
Decrease in traffic violations and accidents

In particular, community-level activities and advertisement of an enforcement campaign appears to be more effective than relying entirely on broad, province-wide mass media enforcement amplification. For example, in the "Kamloops Experiment" Spring CounterAttack 1984 (Mercer, 1986b), the public awareness of a police drinking-driving roadcheck campaign was brought to 51% from a pre-test value of 16%, through the use of community involvement techniques. On the other hand, the remainder of the province showed a post-test awareness of only 14% when only province-wide (as opposed to community level) media amplification of the campaign was utilized.

The CounterAttack Program and members of both the electronic and print media work together, especially during roadcheck campaigns, to make the public aware of the dangers of drinking and driving. One measure of this cooperation is the frequency of print articles on the issue that appear in newspapers throughout the province. These news "clips" can be divided into two types: written articles and "clipsheet" CounterAttack logos and messages that are supplied by the Program and then are printed through the generosity of the newspaper or magazine editors. A graph of print coverage for 1987 and an example of the public service clipsheet follow.

## REFERENCES

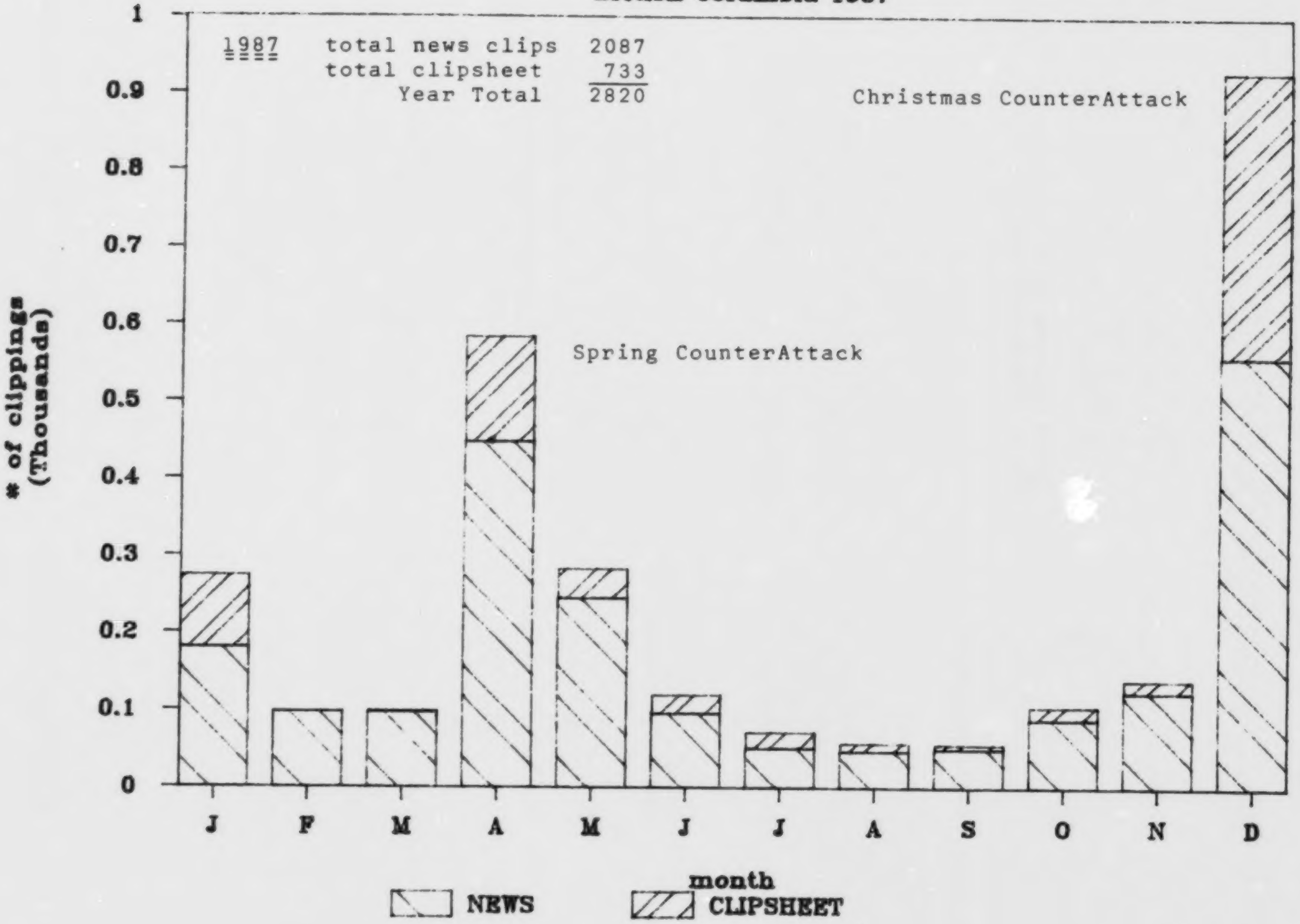
Mercer G.W. The relationship among driving while impaired charges, police drinking-driving roacheck activities, media coverage and alcohol-related casualty traffic accidents. Accident Analysis and Prevention, 17(6), 1985.

Mercer G.W. The effects of media coverage on a two-week police intersection traffic enforcement campaign. Royal Canadian Mounted Police Gazette, 48(12), 1986.

Mercer G.W. The Kamloops experiment: media amplification of a two-week drinking-driving police roadcheck enforcement campaign. In CounterAttack Traffic Research Papers, 1985, Ministry of Attorney General, British Columbia, 1986.

## Press Articles on Drinking-Driving

**British Columbia 1987**



**PUBLIC SERVICE CLIPSHEET, ISSUED FOR COUNTERATTACK, A JOINT PROGRAM OF THE MINISTRY OF ATTORNEY GENERAL AND THE INSURANCE CORPORATION OF B.C.**

*Spring*
COUNTERATTACK
1977-1987
POLICE ROADCHECKS
APRIL 13TH - MAY 4TH

1977-1987
*A DECADE DOWN A SAFER ROAD*
COUNTERATTACK
DRINKING DRIVING
ROADCHECKS - APRIL 13TH - MAY 4TH

*Spring*
COUNTERATTACK
1977-1987
ROADCHECK BLITZ
APRIL 13TH - MAY 4TH

1977-1987
*Spring*
COUNTERATTACK
POLICE
ROADCHECKS
ROADCHECKS - APRIL 13TH - MAY 4TH

*Spring*
COUNTERATTACK
1977-1987
SPRING ROADCHECKS
APRIL 13TH - MAY 4TH

1977-1987
*Spring*
COUNTERATTACK
ROADCHECK
BLITZ
ROADCHECKS - APRIL 13TH - MAY 4TH

COUNTERATTACK
*A DECADE*
*DOWN A*
*SAFER ROAD*
SPRING ROADCHECKS
APRIL 13TH - MAY 4TH

*Spring*
COUNTERATTACK
DRINKING DRIVING
ROADCHECKS
ROADCHECKS - APRIL 13TH - MAY 4TH

COUNTERATTACK
1977 1987
ROADCHECKS - APRIL 13TH - MAY 4TH

1977-1987
*A DECADE DOWN A SAFER ROAD*
COUNTERATTACK
DRINKING DRIVING
SPRING ROADCHECKS
APRIL 13TH - MAY 4TH

# CounterAttack Research Data Sources: Traffic Accident Report Forms (MV104)

# A Note on the Reliability and Validity of Police Reporting of Alcohol Involvement in Casualty Traffic Accidents on the British Columbia Motor Vehicle Department Traffic Accident Report Form (MV104)*

Traffic Accident Report Forms (MV104) are completed by attending police officers at casualty traffic accidents in British Columbia. Analyses of these reports often form the basis for government policy decisions regarding traffic safety priorities, and therefore it is critical that there be a clear understanding of the extent and limits of their reliability and validity, especially with regard to the assessment of the role of alcohol in casualty accidents. This is of particular concern with regard to the CounterAttack Program, as much of the research for the program is done using MV104 data supplied by the Motor Vehicle Department of the Ministry of Transportation and Highways for British Columbia. Consequently, it is the purpose of this note to discuss these matters.

## Definition of Terms - Reliability and Validity:

Before examining this subject, perhaps it would be useful to distinguish between reliability and validity: reliability refers to how consistently a thing measures, while validity refers to how closely that measurement coincides with the true value of what is measures. For example, suppose one had a thermometer that underestimated temperature to some unknown degree. If one used that thermometer to measure temperature from day to day, one could accurately determine the number of degrees change from day

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* First published in CounterAttack Traffic Research Papers, 1984, Ministry of Attorney General, British Columbia, 1985.

ACCIDENT CASE NUMBER 30225 A | ORIGINAL ACN | POLICE FILE NUMBER

## BRITISH COLUMBIA

MOTOR VEHICLE TRAFFIC ACCIDENT
POLICE INVESTIGATION REPORT

21
22

1 DATE OF ACCIDENT | DATE REPORTED | TIME (24 HOUR) | 1 ☐ NON-REPORTABLE (DO NOT FORWARD TO M.V.D.) | 2 ☐ PROPERTY DAMAGE OVER $400 | 3 ☐ PERSONAL INJURY | 5 ☐ FATAL | 6 ☐ H & R

1A POLICE 1 ☐ ATTENDED 2 ☐ DID NOT ATTEND | POLICE CODE | POLICE ZONE | LOCATION CODE | CODE 1 PROV HWY 2 CITY/MUN

24

CITY, MUNIC., TOWN, DISTRICT, VILLAGE

OF: ☐ ORG ☐ UNORG

ACCIDENT LOCATION ON ______________________
AT ______________________
OTHER

2 V ☐☐ P ☐☐ C ☐☐ 99 ☐ N/A ☐ 1 ☐ PO | V ☐☐ P ☐☐ C ☐☐ 99 ☐ N/A ☐ 2 ☐ PO

DRIVER LICENCE NO. | EXPIRY | CLASS | PROV./STATE | DRIVER LICENCE NO. | EXPIRY | CLASS | PROV./STATE 25

LAST NAME | FIRST NAMES | LAST NAME | FIRST NAMES

ADDRESS | ADDRESS 26

2A BUSINESS ADDRESS | BUSINESS ADDRESS

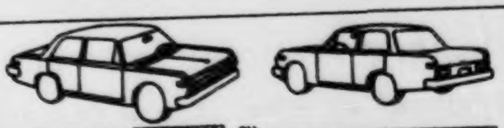
BUSINESS TELEPHONE | BUSINESS TELEPHONE

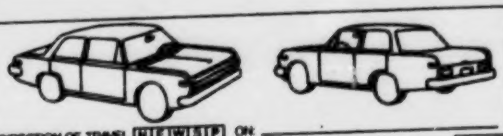
BIRTHDATE Y M D | SEX | HOME TELEPHONE | VEH. COLOR | BIRTHDATE Y M D | SEX | HOME TELEPHONE | VEH. COLOR 27

3 VEH. PLATE NO. | PROV./STATE | YEAR & VEH. MAKE | VEH. STYLE | VEH. PLATE NO. | PROV./STATE | YEAR & VEH. MAKE | VEH. STYLE 28

OWNER NAME AND ADDRESS | OWNER NAME AND ADDRESS 27A

4 28A





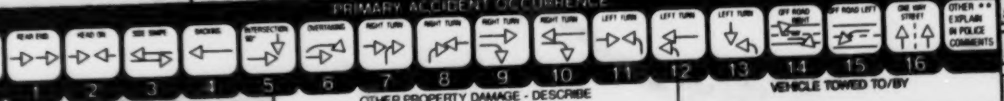
5 29

DIRECTION OF TRAVEL N E W S P ON: ______ | DIRECTION OF TRAVEL N E W S P ON: ______ 30

6 SEVERITY | VEH. 1 DAMAGE $ | VEH. 2 DAMAGE $ | SEVERITY

PRIMARY ACCIDENT OCCURRENCE

CODE


REAR END
1
HEAD ON
2
SIDE SWIPE
3
BACKING
4
INTERSECTION 90°
5
OVERTAKING
6
RIGHT TURN
7
RIGHT TURN
8
RIGHT TURN
9
RIGHT TURN
10
LEFT TURN
11
LEFT TURN
12
LEFT TURN
13
OFF ROAD RIGHT
14
OFF ROAD LEFT
15
ONE WAY STREET
16
OTHER ** EXPLAIN IN POLICE COMMENTS

31
32

7 VEHICLE TOWED TO/BY | OTHER PROPERTY DAMAGE - DESCRIBE | VEHICLE TOWED TO/BY 33

8 ☐ I.C.B.C. POLICY NO. | ☐ I.C.B.C. POLICY NO.
☐ OTHER COMPANY | ☐ OTHER COMPANY
☐ NONE ADDRESS | ☐ NONE ADDRESS 34

9 CHARGES DR. 1 | SECTION | SHORT TITLE | BTA OR BAC DR. 1 DR. 2 | CHARGES DR. 2 | SECTION | SHORT TITLE 35
C M R B | | | 1 2 | C M R B | |
C M R B | | | 1 2 | C M R B | | 36
C M R B | | | | C M R B | |

POLICE COMMENTS Do Not Repeat Information

99 CODE

99 CODE 37

99 CODE

99 CODE

TOTAL INJURED | TOTAL KILLED | TOTAL VEHICLES

POLICE COPY

| | | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | NAMES OF INJURED - IF DECEASED INCLUDE DATE OF DEATH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL INVOLVED | A | | | | | | | | | | | | |
| | B | | | | | | | | | | | | |
| | C | | | | | | | | | | | | |
| | D | | | | | | | | | | | | |
| | E | | | | | | | | | | | | |
| | F | | | | | | | | | | | | |
| | G | | | | | | | | | | | | |
| | H | | | | | | | | | | | | |

OFFICER'S NAME (PRINT) | ID NO. | SHIFT | DIVISION | DATE SUBMITTED | REVIEWED

MV 104 A/V 2 (REV 04/87 MVD 2807)

## NOTE: TWO DIGIT CODES ARE REQUIRED FOR ALL CATEGORIES

REV 04/87

**1** **ROAD CLASS**
1-ONE LANE
2-TWO LANE
3-THREE LANE
4-FOUR LANE
5-FIVE LANE
6-SIX LANE
1 UNDIVIDED
2 DIVIDED
3 RAMP

**1A** **TRAFFIC FLOW**
01 ONEWAY TRAFFIC
02 TWOWAY TRAFFIC

**2** **ACCIDENT LOCATION**
01 AT INTERSECTION
02 BETWEEN INTERSECTION/EXCHANGES
03 INTERSECTION OF ROAD & DRIVEWAY OR ALLEY
04 BRIDGE
05 FERRY OR DOCK
06 TUNNEL
07 EXIT DECELERATION LANE
08 EXIT RAMP
09 EXIT INTERSECTION
10 ENTRANCE ACCELERATION LANE
11 ENTRANCE RAMP
12 ENTRANCE INTERSECTION
13 OFF HIGHWAY
14 PARKING LOT SINGLE/MULTILEVEL
15 RR CROSSING
16 INDUSTRIAL ROAD

**2A** **SPEED ZONES**
1-POSTED SPEED
2-ADVISORY
3-SPECIAL
1 10 Km/h
2 20 Km/h
3 30 Km/h
4 40 Km/h
5 50 Km/h
6 60 Km/h
7 70 Km/h
8 80 Km/h
9 90 Km/h
0 100 Km/h

**3** **LAND USAGE IN ACCIDENT AREA**
01 SCHOOL/PLAYGROUND
02 URBAN RESIDENTIAL
03 APARTMENT RESIDENTIAL
04 BUSINESS/SHOPPING
05 INDUSTRIAL/MANUFACTURING
06 AGRICULTURAL/UNDEVELOPED
07 RECREATIONAL/PARK/CAMPING
08 RURAL RESIDENTIAL

**4** **ROAD TYPE**
01 ASPHALT
02 GRAVEL
03 OILED GRAVEL
04 EARTH
05 CONCRETE
06 BRICK STONE
07 WOOD

**5** **TRAFFIC CONTROL**
01 NONE
02 STOP SIGN
03 YIELD SIGN
04 OFFICER/FLAGMAN/SCHOOL GUARD
05 RAILROAD CROSSING SIGN

OR

2-TRAFFIC SIGNAL &
3-TRAFFIC SIGNAL WITH ADVANCE FLASHERS &
4-FLASHING SIGNAL &
1 RED
2 AMBER
3 GREEN

**6** **ROADWAY CHARACTER**
HORIZONTAL
1-STRAIGHT
2-SINGLE CURVE
3-SHARP CURVE
4-SWITCHBACK
5-WINDING CURVES
6-REVERSE CURVE
VERTICAL
1 FLAT
2 SOME GRADE
3 STEEP GRADE
4 HILLCREST
5 SAG

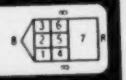
**7** **ROADWAY SURFACE CONDITION**
01 DRY
02 WET
03 MUDDY
04 SNOW
05 SLUSH
06 ICE

**8** **WEATHER CONDITIONS**
01 CLEAR
02 CLOUDY
03 RAINING
04 SNOWING/SLEET
05 HAIL
06 FOG
07 SMOG SMOKE
08 STRONG WIND

**9** **LIGHTING CONDITIONS**
01 DAYLIGHT
02 DAWN
03 DUSK
04 DARK-FULL ILLUM
05 DARK NO ILLUM
06 DARK SOME ILLUM

**10** **INDICATE WHICH VEHICLE OCCUPIED**
01 18 VEHICLE
20-29 BICYCLE
30 39 PEDESTRIAN
90 WITNESS
99 OTHER**

**11** **POSITION IN/ON VEHICLE**
01 DRIVER
02 07 PASSENGERS
09 72 PASSENGERS
08 RIDING/HANGING ON OUTSIDE



**12** **SAFETY EQUIPMENT USED**
01 VEH NOT EQUIPPED
02 NO RESTRAINT USED
03 LAP BELT ONLY
04 HARNESS ONLY
05 LAP & HARNESS
06 AIR BAG
07 CHILD RESTRAINT
08 HELMET
09 NO HELMET

**13** **EJECTION FROM VEHICLE**
01 NOT EJECTED
02 PARTIALLY EJECTED
03 EJECTED

**14** AGE

**15** SEX

**TYPE OF ACCIDENT COLLISION**
01 OTHER MOTOR VEHICLE
02 MOTORCYCLE
03 PEDESTRIAN
04 BICYCLIST
05 ANIMAL
06 RAILROAD TRAIN
07 STREET CAR/TROLLEY COACH
08 ALL TERRAIN VEHICLE
09 MOPED (UNDER 50cc)
20 LIGHT SUPPORT POLE
21 UTILITY SUPPORT POLE
22 GUARD RAIL/TRAFFIC BARRIER
23 CRASH CUSHION IMPACT ATTENUATOR
24 SIGN POST
25 TREE
26 BUILDING/WALL
27 CURBING
28 FENCE
29 BRIDGE DECK OR PARAPET
30 RAISED TRAFFIC ISLAND
31 SNOW BANK/DRIFT
32 ROCK FACE
33 DITCH
34 CULVERT
35 FIRE HYDRANT
36 ROCKS OR DEBRIS
40 OVER TURNED
41 FIRE EXPLOSION
42 SUBMERSION (LAKE RIVER SLOUGH)
43 RAN OFF LEFT ROADWAY
44 RUNAWAY ON GRADE
90 OTHER** EXPLAIN IN POLICE COMMENTS

**SECOND EVENT** **21**

**THIRD EVENTS**
VEH. 1 **22**
VEH. 2 **23**

**24** **LOCATION OF FIRST CONTACT**
01 ON ROADWAY
02 OFF ROADWAY

**PRE-COLLISION VEHICLE ACTION 1ST EVENT**
01 GOING STRAIGHT AHEAD
02 MAKING RIGHT TURN
03 MAKING LEFT TURN
04 MAKING "U" TURN
05 STARTING FROM PARKED POSITION
06 STARTING IN TRAFFIC
07 SLOWING OR STOPPING
08 STOPPED IN TRAFFIC
09 ENTERING PARKED POSITION
10 PARKED LEGALLY
11 PARKED ILLEGALLY
12 AVOIDING OBJECT ON ROAD
13 CHANGING LANES
14 OVERTAKING
15 MERGING
16 BACKING
17 SKIDDING
18 SWERVING
19 SPINNING
20 JACK KNIFING
21 YAW

VEH. 1 **25**
VEH. 2 **26**

**VEHICLE TYPE**
01 PASSENGER CAR
02 CAR & TRAILER
20 SINGLE UNIT TRK LT
21 SINGLE UNIT TRK HV
30 COMB UNIT TRK LT
31 COMB UNIT TRK HV
32 COMB UNIT TRACTOR TRL
33 COMB UNIT TRACTOR TRL & PUP
34 LOG TRK & POLE TRL
35 TOW TRUCK
40 BUS SCHOOL
41 BUS PUBLIC
50 MOTORCYCLE
51 MOPED (50cc)
52 BICYCLE
60 TRUCK CAMPER
61 TRUCK/CAMPER & TRL
62 MOTOR HOME
63 MOTOR HOME/TRL
70 TRAILER ONLY
8 – ATV (SEE LIST ON BACK)
9 - SPECIAL (SEE LIST ON BACK)

VEH. 1 **27**
VEH. 2 **28**

**VEHICLE USE**
01 PARKED
02 PERSONAL
03 BUSINESS COMMERCIAL
04 DRIVER TRAINING SCHOOL
05 RECREATIONAL
06 EMERGENCY
07 MILITARY
08 TAXI
09 FARM USE
11 GOVERNMENT
12 TOWING/TOWED
13 STOLEN
2 – DANGEROUS GOODS (SEE LIST ON BACK)

VEH. 1 **27A**
VEH. 2 **28A**

**PEDESTRIAN LOCATION** **29**
01 AT INTERSECTION
02 NOT AT INTERSECTION

**30**

**PEDESTRIAN ACTION**
01 CROSSING WITH SIGNAL
02 CROSSING AGAINST SIGNAL
03 CROSSING NO SIGNAL MARKED CROSSWALK
04 CROSSING NO SIGNAL NO CROSSWALK
05 WALKING ALONG HIGHWAY WITH TRAFFIC
06 WALKING ALONG HIGHWAY AGAINST TRAFFIC
07 EMERGING FROM BEHIND PARKED VEH
08 CHILD GETTING ON OFF SCHOOL BUS [illegible]
09 ADULT GETTING ON OFF A VEHICLE
10 PUSHING WORKING ON A CAR
11 WORKING IN ROADWAY
12 PLAYING IN ROADWAY
13 STANDING ON SIDEWALK

**16** **LOCATION OF MOST SEVERE INJURY**
01 NO INJURY
02 HEAD
03 FACE NOSE
04 EYE
05 NECK
06 CHEST
07 BACK
08 SHOULDER UPPER ARM
09 ELBOW LOWER ARM HAND
10 ABDOMEN PELVIS
11 HIP UPPER LEG
12 KNEE LOWER LEG FOOT
13 ENTIRE BODY

**17** **TYPE OF INJURY**
01 NONE
02 ABRASION
03 BRUISES
04 LACERATIONS
05 BLEEDING
06 [illegible]
07 DISLOCATION
08 BURNS
09 AMPUTATIONS
10 [illegible]
11 [illegible]
12 WHIPLASH

**18** **STATE OF VICTIM CONSCIOUSNESS**
01 APPARENTLY NORMAL
02 AGITATED
03 INCOHERENT
04 SEMI CONSCIOUS
05 UNCONSCIOUS
06 APPARENTLY DEAD
07 [illegible]

**INJURED TAKEN** **19** **20**

**APPARENT CONTRIBUTING FACTORS**
10 ALCOHOL INVOLVEMENT
11 BACKING UNSAFELY
12 CUTTING IN
13 DRIVING WITHOUT DUE CARE
14 DRIVER INEXPERIENCE
15 DRUGS (ILLEGAL)
16 EXTREME FATIGUE
17 FAILING TO SIGNAL
18 FAILING TO YIELD RIGHT OF WAY
19 FELL ASLEEP
20 FOLLOWING TOO CLOSELY
21 IMPROPER PASSING
22 ILLNESS (EXPLAIN)
23 UNKNOWN LOSS OF CONSCIOUSNESS
24 DRIVING ON WRONG SIDE OF ROAD
25 PEDESTRIAN ERROR CONFUSION
26 PRE EXISTING PHYSICAL DISABILITY
27 PRESCRIBED MEDICATION
28 ATTEMPT AT SUICIDE (CONFIRMED)
29 IGNORING TRAFFIC CONTROL DEVICE
30 IMPROPER TURNING
31 UNSAFE SPEED
32 IGNORING OFFICER FLAGMAN GUARD
33 AVOIDING VEH PED CYCLE
40 ACCELERATOR DEFECTIVE
41 BRAKES DEFECTIVE
42 HEADLIGHTS DEFECTIVE OUT
43 BRAKE LIGHTS OUT
44 TURN SIGNALS DEFECTIVE
45 OVERSIZE VEHICLE
46 STEERING FAILURE
47 TIRES FAILURE INADEQUATE
48 TOW HITCH FAILURE
49 DRIVERLESS VEHICLE
50 WINDSHIELD DEFECTIVE
51 ENGINE FAILURE
52 SUSPENSION DEFECT
53 RESTRAINT SYSTEM
54 INSECURE LOAD
55 DANGEROUS GOODS
60 VEHICLE MODIFICATION **EXPLAIN
61 GLARE ARTIFICIAL
62 GLARE SUNLIGHT
63 OBSTRUCTION DEBRIS ON ROAD
64 PAVEMENT SURFACE DEFECTIVE
65 VISIBILITY IMPAIRED
66 WEATHER
67 ROAD MAINTENANCE CONSTRUCTION
68 PREVIOUS TRAFFIC ACCIDENT
69 SIGN OBSTRUCTION
70 DOMESTIC ANIMAL
71 WILD ANIMAL
72 INSUFFICIENT TRAFFIC CONTROL
73 ROAD INTERSECTION DESIGN
74 ROADSIDE HAZARD
99 OTHER **EXPLAIN IN POLICE COMMENTS

VEH/DR. 1 **31** **32** **33**
VEH/DR. 2 **34** **35** **36**

**SPECIAL STUDY** **37**
IF APPLICABLE PLACE DECAL HERE

**IF DATA NOT PRESENT USE CODE 99 AND EXPLAIN IN POLICE COMMENTS**

to day, yet would not be able to say what the actual temperature was. Because the same instrument was used in the same fashion from day to day, the resulting measures would be reliable, but the measure of temperature on any given day would not be valid, because of the error in the thermometer (i.e. underestimation). On the other hand, the degree of temperature change measured from day to day would be a valid measure.

Finally, if one could gain access to a thermometer that was know to give accurate (i.e. valid) temperature readings, then one could calibrate the inaccurate one to the accurate one and from then on use the inaccurate thermometer to get an accurate reading (e.g. if the inaccurate one was constantly 4 degrees less than the actual temperature, then simply taking the inaccurate reading and adding 4 degrees would produce a valid reading.) As is show below, this analogy applies directly to the MV104 data.

## MV104 Reliability:

It is reasonable to assume that alcohol as a contributing factor as indicated on the MV104 is a reliable measure, as these forms have been completed by the same sort of person (attending police officer) using the same instruction manual under the same conditions (casualty traffic accident) since 1977.

## MV104 Validity in Measuring Change:

If one makes the reasonable assumption that the overall MV104 reporting of alcohol as a contributing factor to the accident is reliable, then it is also a valid measure of change over time. That is, a reported percent change from month to month and year to year can be seen as a more-or-less true reflection of change in the rates of alcohol involvement in casualty traffic accidents, even though the reported levels may not accurately reflect the true levels of alcohol involvement.

MV104 Validity in Measuring Alcohol Involvement:

How closely the MV104 reports of alcohol as a contributing factor to casualty traffic accidents reflect actual levels of alcohol involvement in these accidents is a difficult question, as it very much depends on both the definition of "alcohol involvement" used and whether or not one is referring to a fatal or injury-only accident. In addition, there is a real problem in finding reliable and valid measures of alcohol involvement, however defined, with which to compare the MV104 reports.

Fatal Traffic Accidents: In B.C. fatal traffic accidents comprise about 2% of all police investigated casualty traffic accidents. One source of alcohol data comes from coroner's reports. However, there are a number of aspects of coroner's reports that make them difficult to compare to the MV104 assessment of alchol as a significant contributing factor to these accidents. First, not all drivers killed have toxicologies done or reported. Certainly, it is more likely that a toxicology will be done on a driver who is dead on arrival to hospital or shortly thereafter, but these drivers tend to come from high-speed (and therefore more violent) accidents which in turn have been shown to be those accidents most likely to be alcohol-related. Second, a toxicology reports the presence or absence of alcohol at thus-and-such a level, while the police are reporting not presence or absence but rather whether or not alcohol was a significant contributing factor to the accident. Finally, it is arguably more difficult for an attending officer to assess the role and/or presence of alcohol from a dying or dead victim than it could be if the person were less severely injured.

For all the above reasons, one would expect that the proportion of fatal traffic accidents where the investigating officers consider alcohol to be a causal (i.e. contributing) factor to be substantially less than the proportion of fatal accidents where the coroner reports alcohol to be present. In fact, in 1983 the B.C. Coroner reported that 50% of the drivers killed showed toxicological evidence of having consumed alcohol, while the MV104 data indicated that alcohol was considered to be a significant contributing factor to about 36% of fatal accidents.

Injury-only Traffic Accidents: Injury-only casualty traffic accidents comprise about 98% of all casualty accidents in B.C. The only source of alcohol data (other than MV104) for these accidents comes from a CounterAttack study done in 1977-78 on injured persons entering the Royal Columbian Hospital. That study indicated that 26% of those drivers tested had a Blood Alcohol Content (BAC) of .08 or greater, and 14% had a BAC of .15 or greater, while the police estimated that alcohol was the primary single cause of the accident in 17% of the cases. Exactly how one reconciles these figures is open to question.

An Overview:

Using American police and coroners' reports, J.C. Fell in Tracking the Alcohol Involvement Problem in U.S. Highway Crashes (27th Annual Proceedings, American Association for Automotive

Medicine, 1983) notes that when the police designate a driver to have alcohol involvement, they are in error about 5% of the time. He also indicates that, using both coroner and police data in combination, nationally alcohol was involved in 55-58% of fatal accidents, 17% of injury-only accidents, 8% of property-damage-only accidents, and 11% of all accidents. However, the problem of the role of alcohol and how it relates to these figures is still unanswered. The presence or absence of alcohol, except at very high BAC levels, does not necessarily guarantee it a role in the cause of the accident. It is clear from this discussion that the police, when judging the role of alcohol as a contributing factor to casualty traffic accidents, produce figures which are less than those which speak to the presence or absence of alcohol, and that their figures on causation show a greater difference for fatal accidents (which comprise about 2% of their accident investigation burden) than for injury-only accidents (which comprise about 98% of their accident investigation burden).

While it is important to more precisely determine the magnitude of the difference between the police judgement of alcohol as a causative factor and the presence of alcohol --and this can only be done through ongoing hospital and coroner studies-- two things can be suggested concerning alcohol as a significant contributing factor in casualty accidents as indicated on the Traffic Accident Report Form (MV104) completed by the attending officer at these accidents: first, that the MV104 data can probably be taken as an accurate (i.e. reliable and valid) indicator of changes in the rate of alcohol involvement over time. And second, that the police data are probably a reasonable indicator of both the role and presence of alcohol in injury-only accidents, however, can only be seen as a measure of the role, not absolute chemical presence or level, of alcohol in fatal traffic accidents.

Finally, perhaps the only way to detemine this level of accuracy for the B.C. police forces is to change the MV104 so that they are required not only to judge whether or not alcohol played a significant role in the accident under investigation, but also to judge its presence or absence.

# COUNTERATTACK PROGRAM EVALUATION GUIDE FOR COMMUNITY VOLUNTEERS

## WHAT IS PROGRAM EVALUATION?

The purpose of this CounterAttack guide to program evaluation is to allow local CounterAttack groups to evaluate a program initiative such as a roadcheck blitz or public information campaign. Program evaluation is necessary in order to determine the causes of program success or failure and to decide whether or not to continue or repeat programs. There are a number of levels to program evaluation, and while every community group, traffic safety manager, or police manager may not be able to complete a full program evaluation at every level, some attempt at evaluation should be made. The levels of program evaluation are:

1. What was done:
   Number of brochures distributed, meetings attended etc.
2. Public Awareness/Knowledge:
   a) Indirect - newspaper, T.V. radio
   b) Direct - pre/post surveys
3. Changes in target behaviours

### What was Done:

Minimally, there must be a clear record of what was done. How many brochures and posters were distributed? To whom? How many meetings were there? With whom? And so on. You must at least be able to give a coherent, quantified account of what you did. The Spring CounterAttack Review created by I.C.B.C.'s Traffic Safety Education Department in Appendix A can give you ideas of the type and extent of information that needs to be collected.

**Public Awareness/Knowledge:**

A program can have no effect if nobody knows about it. Consequently, the second level of program evaluation involves trying to measure whether or not anybody knows about what was done, and what they thought about it. This can be measured indirectly by determining the extent to which the program or campaign was publicized by the media, and can be measured directly by comparing the results of a public awareness survey conducted before the campaign with the results of the same public awareness survey conducted after the campaign (i.e. pre/post surveys).

Regarding measures of public awareness through the extent of media coverage, probably the easiest way of doing this is to collect newspaper articles dealing with the issue. Clearly, if the media has ignored the program, then it is not likely that the general public will be aware of it, whereas if there is extensive media coverage, then it is much more likely that the public were involved with the issue. Newspaper articles on drinking-driving issues must be gathered and counted from at least a month before the campaign to a week or two after the end of the campaign in order to see if there were changes in media coverage of the issue. (Graphs showing the number of articles over time are good illustrations of changes in newspaper coverage). Finally, local newspaper offices or libraries often keep back issues of newspapers, and these sources can allow all of the print media data collection to be done in one place after the campaign.

On the other hand, a much better way to determine whether or not the public is aware of a program or if the program had any effect on people's attitudes, knowledge, or behaviours is to ask them before and after the program and then see if there are any differences in their responses. Appendix B contains a description of the procedures to carry out pre/post surveys and a copy of a survey used by CounterAttack to measure the effects of the provincial program efforts.

**Changes in Target Behaviours:**

For the CounterAttack program, the target behaviour for change is drinking driving. Unfortunately, there are no easy ways to directly measure the extent of drinking driving. For example, drinking-driving charge rates vary with both police resources (e.g. more police effort, more charges) and with publicity for roadcheck campaigns (e.g. as publicity goes up, drivers' perceived risk of apprehension goes up, drinking driving goes down, and charges go down). Consequently, charge rates are not a valid measure of drinking-driving rates.

Probably the best measure of the extent of drinking driving is the frequency of alcohol-related traffic accidents. However, as traffic accidents are a relatively rare occurrence, it is usually impossible to meaningfully compare the number of alcohol-related accidents during the few weeks of a campaign with those before the campaign. (That sort of comparison can be done on a province-wide basis, but not at a community level).

It follows that community-level program evaluation has to deal only with the first two levels of evaluation: what was done and did the public know about it.

# APPENDIX A

# SPRING COUNTERATTACK REVIEW

## SPRING COUNTERATTACK REVIEW

### GENERAL COMMENTS

In your opinion:

1. What worked "best" for the provincial campaign?

____________________________________________________________

____________________________________________________________

____________________________________________________________

Why? ______________________________________________________

____________________________________________________________

2. What did not "work" for the provincial campaign?

____________________________________________________________

____________________________________________________________

____________________________________________________________

Why? ______________________________________________________

____________________________________________________________

3. What would have made this campaign better?

____________________________________________________________

____________________________________________________________

____________________________________________________________

4. What was the most effective community activity?

____________________________________________________________

____________________________________________________________

Why? ______________________________________________________

5. What was the least effective community activity?

____________________________________________________________

____________________________________________________________

Why? ______________________________________________________

6. What recommendations do you have for future campaigns?

____________________________________________________________

____________________________________________________________

7. Additional Comments.

____________________________________________________________

____________________________________________________________

____________________________________________________________

## SPRING COUNTERATTACK REVIEW

(Municipality) ____________ (Population) ____________ (C.P.M.) ______ / ______ (C.P.A.)

### A. MUNICIPAL COUNCIL ACTIVITIES

| Check if yes | | LIST MATERIALS USED (attach samples if applicable) |
|---|---|---|
| ☐ | Proclamation | ____________ |
| ☐ | Public/Council meeting | ____________ |
| ☐ | Street Banner | ____________ |
| ☐ | P.S.A.s | ____________ |
| ☐ | Mailouts | ____________ |
| ○ | ____________ | ____________ |
| ○ | ____________ | ____________ |
| ○ | ____________ | ____________ |

### B. CHAMBER OF COMMERCE ACTIVITIES

| Check if yes | | |
|---|---|---|
| ☐ | Public announcement/ (lunch/dinner) | ____________ |
| ☐ | Street Banner | ____________ |
| ☐ | Newsletter | ____________ |
| ☐ | Mailouts | ____________ |
| ○ | ____________ | ____________ |
| ○ | ____________ | ____________ |
| ○ | ____________ | ____________ |
| ○ | ____________ | ____________ |

## C. WORKPLACE ACTIVITIES

**LIST MATERIALS USED**

Type ____________________
No. of Employees ________

☐ Presentation ____________________________
☐ Pay envelope stuffer ____________________________

Type ____________________
No. of Employees ________

☐ Presentation ____________________________
☐ Pay envelope stuffer ____________________________

Type ____________________
No. of Employees ________

☐ Presentation ____________________________
☐ Pay envelope stuffer ____________________________

Type ____________________
No. of Employees ________

☐ Presentation ____________________________
☐ Pay envelope stuffer ____________________________

Type ____________________
No. of Employees ________

☐ Presentation ____________________________
☐ Pay envelope stuffer ____________________________

Type ____________________
No. of Employees ________

☐ Presentation ____________________________
☐ Pay envelope stuffer ____________________________

**D. LICENSED ESTABLISHMENT ACTIVITIES** **LIST MATERIALS USED**

Type ____________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

Type ____________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

Type ____________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

Type ____________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

Type ____________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

o ____________________ ____________________________

## E. HEALTH ACTIVITIES

Facility ______________________________

☐ Public meeting

☐ Mall display

- o ____________________
- o ____________________

Facility ______________________________

☐ Public meeting

☐ Mall display

- o ____________________
- o ____________________

Facility ______________________________

☐ Public meeting

☐ Mall display

- o ____________________
- o ____________________

Facility ______________________________

☐ Public meeting

☐ Mall display

- o ____________________
- o ____________________

## F. BUSINESS ACTIVITIES

## LIST MATERIALS USED

Location/type ____________________

- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________

Location/type ____________________

- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________

Location/type ____________________

- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________

Location/type ____________________

- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________

Location/type ____________________

- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________
- ____________________ ______________________________

## G. COMMUNITY GROUP ACTIVITIES LIST MATERIALS USED

Local Traffic Safety Committee ____________________

- o ____________________ ____________________
- o ____________________ ____________________
- o ____________________ ____________________

Safety Council ____________________

- o ____________________ ____________________
- o ____________________ ____________________
- o ____________________ ____________________

Service Clubs ____________________

- o ____________________ ____________________
- o ____________________ ____________________
- o ____________________ ____________________

M.A.D.D. ____________________

- o ____________________ ____________________
- o ____________________ ____________________
- o ____________________ ____________________

o ________________________________________

- o ____________________ ____________________
- o ____________________ ____________________
- o ____________________ ____________________

o ________________________________________

- o ____________________ ____________________
- o ____________________ ____________________
- o ____________________ ____________________

## H. SCHOOL ACTIVITIES — LIST MATERIALS USED

District Committee

- o ______________________ ______________________
- o ______________________ ______________________

Secondary

- o ______________________________
  ______________________ ______________________
  ______________________ ______________________
- o ______________________________
  ______________________ ______________________
  ______________________ ______________________
- o ______________________________
  ______________________ ______________________
  ______________________ ______________________
- o ______________________________
  ______________________ ______________________
  ______________________ ______________________

Post Secondary and other

- o ______________________________
  ______________________ ______________________
  ______________________ ______________________
- o ______________________________
  ______________________ ______________________
  ______________________ ______________________
- o ______________________________
  ______________________ ______________________
  ______________________ ______________________

## I. I.C.B.C. ACTIVITIES — **LIST MATERIALS USED**

Claim Centre

____________________ ____________________

____________________ ____________________

Agents

- ____________________
  ____________________ ____________________
  ____________________ ____________________
- ____________________
  ____________________ ____________________
  ____________________ ____________________
- ____________________
  ____________________ ____________________
  ____________________ ____________________
- ____________________
  ____________________ ____________________
  ____________________ ____________________

## J. POLICE ACTIVITIES — **LIST MATERIALS USED**

Please indicate - ☐ R.C.M.P. ☐ Municipal

☐ Roadblocks ____________________

____________________

- ____________________ ____________________
- ____________________ ____________________

## K. SPECIAL EVENTS - Please list

- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________
- ____________________

# APPENDIX B

## COUNTERATTACK PRE/POST TELEPHONE SURVEY

# COUNTERATTACK PRE/POST CAMPAIGN COMMUNITY TELEPHONE SURVEY

## INTRODUCTION

The purpose of this telephone survey guide is to provide a data base which will serve as part of an ongoing program evaluation system for community-based CounterAttack campaigns. Much of the methodology for this survey was developed by C. Thomas Hathaway Associates for the Police Services Branch of the Ministry of Attorney General for use by the R.C.M.P. in their assessment of crime prevention issues.

The objective is to conduct a telephone survey of the population before and after each CounterAttack campaign. The specific objectives of the survey are to provide measures of the following:

1. Respondent age and sex;
2. Current awareness of drinking-driving campaign activity;
3. Sources of information regarding drinking-driving campaign activities;
4. Perceived likelihood of being pulled over when driving while impaired;
5. Perceived likelihood of being charged when driving while impaired;
6. Awareness of groups which have been campaigning against drinking driving;
7. Awareness of maximun penalty for a first offence for drinking driving;
8. Awareness of changes in Criminal Code of Canada with regard to impaired driving;

9. Recent experience with drinking driver roadblocks or spot checks;
10. Recent drinking driving behaviour;
11. Recent drinking driving passenger experience;
12. Drinking driving charge history;
13. Respondent's anti-drinking driving activities.

The survey would be conducted before and after each CounterAttack Roadcheck campaign. It would involve a sample of 100 respondents before and a different 100 respondents after the campaign. The survey would be organized by the local CounterAttack committees.

As the survey will take about 10 minutes per respondent, with 100 respondents the total time required for interviewing is about 16 telephone hours for each of the pre and post surveys. An additional 16 telephone hours for each of the pre and post surveys will be needed to contact enough people to complete the survey (i.e. some will refuse, not be home etc.). Total telephone time = 64 hours.

The survey itself is based upon a modification of a previous CounterAttack survey conducted on a province-wide basis by C. Thomas Hathaway Associates.

## SAMPLE SIZE RATIONALE:

As a general rule, a sample size of 250 would allow the assumption of an error factor of ± 5% with regard to generalizing the answers of respondents to the population as a whole. A sample size of 100 requires the assumption of a possible error of ± 10%.

The decision to use a sample size of 100 is based on the following factors:

1. The desirability of having a standard sample size for all areas, to simplify the instructional requirements;
2. The desirability of reducing the workload in order to reduce resistance to implementation, and to reduce cost;
3. The use of untrained personnel and the nature of the information requirements do not allow for or require a degree of precision beyond that produced by the selected sample size;
4. A sample size of 100 creates the possibility of local analysis by providing "automatic" percentages.

## LIMITS TO ANALYSIS

By asking 100 people before a campaign a series of questions and then asking a different 100 people the same series of questions after a campaign, some idea of the impact of the campaign can be gained. For example, if 14% (i.e. 14 out of 100 people) said "they thought it was likely they would be stopped by police if they were drinking and driving" before a campaign and 50% (i.e. 50 out of 100 people) thought that they would likely be stopped if they were drinking driving when asked after a campaign, then one might suspect that the campaign increased people's perception of apprehension for drinking and driving.

However, the question arises as to how big a difference between the "before" and "after" figures one would need to be able to conclude that there really was a difference. In the example above, there was an increase from 15% to 50% (i.e. 36%).

As a sample size of 100 gives a 10% error, the "true" value of the "before" figure of 14% is really 4% to 24%, while the "true" value of the second figure is 40% to 60%. As the upper limit of the first survey result (24%) is less than the lower limit of the second result (40%), then there probably was a real difference in public perception after the campaign.

On the other hand, if the first survey result was 20% (giving a range with 10% error of 10% to 30%) and the result of the second survey was 40% (giving a range of 30% to 50%), then one would have to say that there probably was no real difference between the 20% pre-campaign result and the 40% post-campaign result.

It is very important that the results be considered in the light of the above information.

One of the reasons for selecting a sample size of 100 is that the sums of all of the answers are automatically percentages.

The questionnaire allows for 2 types of answers. In some questions, the number of the answer simply represents the answer, i.e. 1 means YES, 2 means NO, X means DON'T KNOW etc.

For example if in answering Question 3, 65 respondents say "TV", 34 say "RADIO", and 1 refuses to answer, then it is the case that 65% of the respondents found out by television, and 34% by radio and so on.

If less than 100 respondents give a rating, i.e. some X's (DON'T KNOW) or some Y's (REFUSE TO ANSWER), then the sum of all numbered answers must be divided by 100 minus the number of X's and Y's. For example, if the totalled answers for Question 6 is 710 but 15 respondents said DON'T KNOW or REFUSE TO ANSWER, then 710 must be divided by 100 - 15 (=85). Thus the final result would be 710 divided by 85 which equals 8.35.

In order to draw the conclusion that this rating can be generalized as the average opinion of the community population, as a whole, the SAMPLING procedures must be carried out EXACTLY as indicated. If the sampling is done in any way which does not give every person or residential phone number an equal chance of being selected, then it is not possible to assert that the results of the survey represent the general opinions of the area's population.

**BEFORE YOU BEGIN TO GATHER YOUR SAMPLE:**

1. Read through the INSTRUCTIONS, QUESTIONNAIRE, and CODE SHEETS a few times.
2. Try out the Questionnaire procedure a few times with someone over the phone. Preparation and practice will make the questioning and recording of answers move much more smoothly.
3. Call ____________ at Traffic Safety Education, before beginning, if you have any questions.

Remember, the entire sampling exercise, survey, and analyses must be done before and after the campaign.

## SAMPLING: HOW TO DO IT

The purpose of "sampling" is to try and guarantee that all members of the public who are over 15 years of age have an equal chance of being included in the survey. If this is achieved, then the results may be used to draw conclusions about generally held opinions among the public in the area being surveyed.

The goal is to make a "random selection" of 100 members of the public. This can be done through use of listings in the local telephone directory, when identifiable prefixes (the first 3 numbers in the 7 digit telephone number) are only used within a particular area.

Therefore, the first thing you must do is determine which prefixes are used exclusively for your community. Call the local B.C. Tel office for this information (make a note of the acceptable prefixes on the code sheet).

If there are no prefixes used only for your area, (i.e. Colwood, where the phone numbers are mixed in with Victoria) then a Voter's list can be used.

In either case the selection procedure for potential respondents is the same and only RESIDENTIAL numbers are used.

The next decision which has to be made is whether to use pages, columns or names as locators for respondent phone number selections. The decision should be based on the number of individual names listed and how the list is organized.

Remember, all of the names on the list must have an equal chance of being selected. So, when following these instructions, make sure that the selection of numbers is evenly divided throughout the list, from beginning to end.

Given that the goal is to select 100 names/phone numbers:

- if there are a 100 pages, use pages.
- if there are 100 or more columns, but less than 100 pages, use columns.
- if there are less than 100 pages or columns, use names.

a) Divide the pages, columns or names on the list by 100. For example, where there are 300 pages/columns/names, the result would be 3. (when the result, for pages or columns is not a whole number, i.e. 1.0, round off to the nearest 1/4 (.25) of a page or column). This is the "skip interval". It is the distance you must move between selected numbers.

b) Beginning with the first appropriate page/column/name (in the case of our example, this would be the 3rd page/column/name) record the 1st residential phone number which has a prefix for the local area. If the listing is not for a residence or does not have the right prefix, take the next listing which is both residential and has the correct prefix.

c) Record the selected number on the "code sheet".

d) Go to the next appropriate page/column/name (in the case of our example, this would be the 6th page/column/name) and repeat the procedure, recording the selected number on the "code sheet".

e) Continue the procedure until there are 100 residential phone numbers on the "code sheet".

## USE OF THE QUESTIONNAIRE

The attached questionnaire has all of the necessary instructions on the cover page.

Before you begin, make sure that the survey coordinator is prepared to confirm that the survey is legitimate.

1) Fill in all (blanks) on the questionnaire. For example, in the case of the Kelowna area, the introductory paragraph would read:

> My name is (your FULL NAME). I'm calling for a provincial traffic safety program. We are conducting a survey of residents in the (KELOWNA) area and your household has been randomly selected to represent the people in your area.

2) Dial the first phone number on the code sheet.

3) Follow the instructions for the use of the questionnaire. If there is no answer or a busy signal, repeat the call twice at some other time. If the call is unsuccessful (the potential respondent refuses to participate, the interview cannot be completed, or after 3 attempts to get an answer) add one digit to the phone number, (660-2345 becomes 660-2346, 254-2399 becomes 254-2400) note the change on the code sheet, and repeat the procedure.

4) Record all of the answers for each respondent in the spaces provided on the code sheet.

5) When the call is completed, the answers recorded on the code sheet and checked for legibility/completeness, go on to the next phone number on the code sheet.

## CODE SHEET INSTRUCTIONS

(please use a PENCIL for all work on the CODE SHEET)

The code sheet is the place where all of the phone numbers selected during the sampling procedure are recorded and the place where all of the respondents answers are recorded.

The code sheet has spaces for location, an I.D. number for each respondent and the respondent's phone number.

In the spaces for location, enter the 3 first letters of the location name. For example, the code for Kelowna would be KEL.

You will note that the Respondent I.D.'s 001 through 100 are already entered in the proper spaces.

In the spaces for respondents' phone numbers, enter the numbers selected during the sampling procedure.

In the space for "call back", when you get a busy signal or no answer, put a 1 in the box. Each time you repeat the call, put another 1 in the box. When there are three 1's in the box, erase them and add 1 digit to the phone number. Then repeat the calling procedure. (if you have to schedule a call-back to reach the proper respondent at a more convenient time, put a 2 in the box and note the time for the call-back).

In the spaces for respondent's answers, enter the number or the letter of the answer in the space below the number of the question you are asking. For example, if the answer to Question 1 was "YES" enter 1 in the space for Question 1.

The example below illustrates the call to a Kelowna resident, two busy signals had been gotten before the call was completed and the answers to the first 3 questions were "YES", "ANNOUNCEMENTS", and "DON'T KNOW".

| Area | Respondent I.D. # | Phone # | Call-back | Questions | | | |
|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 |
| KEL | 001 | 762-???? | 11 | 1 | 2 | X | |

# QUESTIONNAIRE

## COUNTERATTACK SURVEY

- ALL OF YOUR INSTRUCTIONS ARE IN CAPS.
- EVERYTHING YOU SAY TO RESPONDENTS IS IN **Bold Face**
- DO NOT READ WORDS IN CAPS TO RESPONDENTS
- ENTER THE NUMBER OR LETTER OF ANSWER WHICH MOST CLOSELY MATCHES THE RESPONDENT'S ANSWER IN THE SPACE PROVIDED UNDER THE QUESTION NUMBER ON THE CODE SHEET.
- BEFORE BEGINNING, MAKE SURE THAT THE SURVEY COORDINATOR IS PREPARED TO CONFIRM THAT THE SURVEY IS BEING DONE.
- MAKE SURE THAT ALL (BLANKS) HAVE BEEN FILLED IN AS INDICATED IN THE INSTRUCTION MANUAL.

**"Hello, is this** (READ THE NUMBER YOU DIALLED)?"

IF YES, PROCEED

IF NO: SAY **"sorry to have bothered you"** AND DIAL AGAIN

**"My name is (________________________). I'm calling for a provincial traffic safety program. We are conducting a survey of residents in the (____________________) area and your household has been randomly selected to represent the people in your area."**

IF RESPONDENT SAYS THEY DO NOT LIVE IN THE AREA, SAY:

**"sorry to have bothered you"** AND

ADD ONE DIGIT TO THE PHONE NUMBER AND DIAL AGAIN

**"May I please speak to the person in your household who is sixteen or older, and who has had the most recent birthday?"**

IF THE PERSON WHO ANSWERS THE PHONE IS 16 OR OLDER AND HAS HAD THE MOST RECENT BIRTHDAY, BEGIN WITH (A)

IF NOT, ASK TO SPEAK TO THE PERSON WHO IS, REPEAT THE INTRODUCTION, CONFIRM THAT YOU ARE SPEAKING TO THE RIGHT PERSON AND BEGIN WITH (A)

IF REFUSAL, SAY:
**"we would appreciate your help in the survey because the information you provide would be of some help in increasing traffic safety in your area"**

IF STILL REFUSAL SAY:
**"thank you for your time"**

ADD 1 DIGIT TO THE PHONE NUMBER AND DIAL AGAIN. BEGIN WITH INTRODUCTION, AS ABOVE.

IF CORRECT PERSON IS NOT AVAILABLE, SCHEDULE CALL-BACK

IF RESPONDENT ASKS: "WHAT DOES IT MATTER HOW OLD I AM OR WHEN MY BIRTHDAY WAS?"

SAY: **"It's just a technique we use to make sure that everyone has an equal chance of being included in the survey."**

IF RESPONDENT ASKS: "HOW DID YOU GET MY PHONE NUMBER?"

SAY: **"We took random numbers from the phone book for your area."**

IF THE RESPONDENT ASKS "WHAT IS THIS ABOUT?"

SAY: **"We are conducting a survey on the experiences and concerns which the people in your area have about traffic safety."**

IF THE RESPONDENT ASKS "HOW DO I KNOW YOU'RE TELLING THE TRUTH?"

SAY: **"You may call (____________) to verify the survey."**

IF RESPONDENT ASKS FOR ANY MORE INFORMATION ABOUT ANY QUESTION IN THE SURVEY, JUST REPEAT THE QUESTION. IF RESPONDENT STILL NOT SATISFIED SAY:

**"I'm sorry but that is all the information I have. I have to ask each question, in this form, in the same way, to each person I call."**

**[(A)]**

**"The survey will only take 5 minutes, and your answers will be kept strictly confidential. Can we begin now?"**

IF YES, GO TO QUESTION 1

IF NO, SCHEDULE CALL-BACK AND THEN DIAL NEXT NUMBER

## QUESTIONS:

READ THE QUESTIONS BUT NOT THE ANSWERS TO THE RESPONDENT. THE ANSWERS SHOULD JUST BE CODED ON THE CODE SHEET. DO NOT SUGGEST ANSWERS TO THE RESPONDENT.

1. **Are you aware of any recent drinking-driving campaign activity in your area within the last month?**

    1. Yes
    2. No (GO TO 4)
    X. Don't Know (GO TO 4)
    Y. Refused (GO TO 4)

2. **What activities?**

    1. Police Roadblocks/spot checks
    2. Announcements
    3. Advertising
    4. Other (specify)
    X. Don't Know
    Y. Refused

3. **How did you find out about the campaign?**

    1. T.V.
    2. Radio
    3. Newspapers
    4. Posters
    5. Word of mouth
    6. Mall display
    7. Payroll envelope
    8. Utility bill
    9. Presentation (school, work, service club)
    10. Vehicle decals
    11. Police roadblock/spot check (saw or stopped by)
    12. Other (specify)
    X. Don't know
    Y. Refused

4. **Can you name any public or private groups, programs or organizations that have been campaigning against drinking and driving?**

| | | |
|---|---|---|
| 1. | BCAA | |
| 2. | ICBC | |
| 3. | Government | |
| 4. | CounterAttack | |
| 5. | The police | |
| 6. | Ministry of Transportation | |
| 7. | Liquor Distribution Branch | |
| 8. | MADD | |
| 9. | Citizen's groups | |
| 10. | Alcoholics Anonymous | |
| 11. | Labatts | |
| 12. | Liquor companies | |
| 13. | Broadcasters Association | |
| 14. | White Spot | |
| 15. | B.C. Transit | |
| 16. | Other (specify) | |
| 17. | Aware but can't name any | (GO TO 6) |
| X. | Don't know | (GO TO 6) |
| Y. | Refused | (GO TO 6) |

5. **Any others?** (AS IN QUESTION 4)

**"One aspect of travelling involves being on the road with people who have been drinking. My next few questions are on this topic. I would like you to imagine an average 150 pound person who has had three or four drinks, that is beers, glasses of wine or single shot liquor drinks, within the previous hour. He then drives home, which takes him about twenty minutes and uses both main and residential streets. The time is 10 p.m. on a Saturday night."**

**"Please answer on a scale of 0 to 10, where 0 means there would be no chance and 10 means it is certain."**

6. **How likely do you think it would be for this person to be pulled over by the police for drinking driving?**
   1. _____ (0 to 10)
   X. Don't know
   Y. Refused

7. **If the person were pulled over, how likely do you think it is that he would be charged with drinking driving?**
   1. _____ (0 to 10)
   X. Don't know
   Y. Refused

8. **Do you happen to know the maximum penalty for a first offence for drinking driving in British Columbia?**

   1. Yes
   2. No (GO TO QUESTION 11)
   3. Refused (GO TO QUESTION 11)

9. **What is it?**

   (SEE CODE OPTIONS ON PAGE 34)

10. **Any others?**

   (SEE CODE OPTIONS ON PAGE 34)

11. **Do you recall when impaired driving laws in the Criminal Code of Canada were last revised or changed? (If yes, when?)**

   1. 1981 (or before)
   2. 1982
   3. 1983
   4. 1984
   5. 1985
   6. 1986 (December 1986 = correct)
   7. 1987
   8. 1988
   X. Don't know (GO TO QUESTION 14)
   Y. Refused (GO TO QUESTION 14)

12. **Can you describe what any of those changes were? (If yes, what?)**

   1. Requirement to provide a blood sample.
   2. New charge (Impaired driving causing bodily harm)
   3. New charge (Impaired driving causing death)
   4. Longer licence suspension
   5. Higher fines
   6. Longer jail terms
   7. "Stiffer penalties"
   8. Other
   X. Don't know (GO TO QUESTION 14)
   Y. Refused (GO TO QUESTION 14)

13. **Any Others?**

   1. Requirement to provide a blood sample.
   2. New charge (Impaired driving causing bodily harm)
   3. New charge (Impaired driving causing death)
   4. Longer licence suspension
   5. Higher fines
   6. Longer jail terms
   7. "Stiffer penalties"
   8. Other
   X. Don't know (GO TO QUESTION 14)
   Y. Refused (GO TO QUESTION 14)

20. **Have you ever reported a drinking driver to the police?**

    1. Yes
    2. No
    X. Don't know
    Y. Refused

21. **Have you ever been charged with driving while impaired?**

    1. Yes
    2. No
    X. Don't know
    Y. Refused

22. **Finally, so that we can check the accuracy of our sample, may I ask how old you are?**

    1. ________________ (16 through 99)
    Y. Refused

**Those are all my questions. Thank you very much for your time.**

23. Record respondent's sex

    1. male
    2. female

| | PENALTY CODE | CORRECT |
|---|---|---|
| LICENCE SUSPENSION | | |
| 24 hours/1 day/overnight | 10 | |
| 2 days to 7 days (1 week) | 11 | |
| 8 days (over 1 week) to 14 days | 12 | |
| Over 2 weeks to 1 Month | 13 | |
| Over 1 Month to 3 Months | 14 | |
| Over 3 Months to 6 Months | 15 | |
| Over 6 Months to 1 year | 16 | * |
| 1 Year and over | 17 | * |
| Suspension (unspecified time - loss of licence) | 19 | |
| FINE | | |
| $1 - $50 | 20 | |
| $51 - $100 | 21 | |
| $101 - $200 | 22 | |
| $201 - $500 | 23 | |
| $501 - $1000 | 24 | |
| "Up to $2000, $1,000 - $2,000 | 25 | * |
| Over $2,000 | 26 | |
| Fine (unspecified amount) | 29 | |
| JAIL TERM | | |
| 24 hours/1 day/overnight | 30 | |
| 2 days to 7 days (1 week) | 31 | |
| 8 days (over 1 week) to 14 days | 32 | |
| Over 2 weeks to 1 Month | 33 | |
| Over 1 Month to 3 Months | 34 | |
| Over 3 Months to 6 Months | 35 | * |
| 6 Months exactly | 36 | * |
| Over 6 months to 1 year | 37 | |
| 1 Year and over | 38 | |
| Jail term (unspecified term - PD) | 39 | |
| POINTS | | |
| Points | 40 | |
| Criminal record/court appearance for more than 5 points | 41 | * |
| Warning/suspended sentence for more than 5 points | 42 | |
| INSURANCE | | |
| Cancellation of auto insurance | 51 | * |
| Cost of auto insurance increase | 52 | * |
| MISSING DATA | | |
| Other (specify) | 96 | |
| Refused | 97 | |
| Don't know | 98 | |
| Not stated | 99 | |

## CODE SHEET

| AREA | I.D.# | PHONE # | CALL-BACK | QUESTIONS | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 0 0 1 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 2 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 3 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 4 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 5 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 6 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 7 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 8 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 0 9 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 1 0 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 1 1 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 1 2 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 1 3 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 1 4 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 0 1 5 | - | | | | | | | | | | | | | | | | | | | | | | | | |

## CODE SHEET

| AREA | I.D.# | PHONE # | CALL-BACK | QUESTIONS | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 016 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 017 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 018 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 019 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 020 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 021 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 022 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 023 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 024 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 025 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 026 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 027 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 028 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 029 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 030 | - | | | | | | | | | | | | | | | | | | | | | | | | |

## CODE SHEET

| AREA | I.D.# | PHONE # | CALL-BACK | QUESTIONS | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| | 031 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 032 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 033 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 034 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 035 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 036 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 037 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 038 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 039 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 040 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 041 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 042 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 043 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 044 | - | | | | | | | | | | | | | | | | | | | | | | | | |
| | 045 | - | | | | | | | | | | | | | | | | | | | | | | | | |

## CODE SHEET

| AREA | | | I.D.# | | | PHONE # | | | | | | | | CALL-BACK | QUESTIONS | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | 1 | 2 | 3 | | 4 | | 5 | | 6 | 7 | 8 | 9 | | 10 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | | 23 |
| | | | 0 | 4 | 6 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 4 | 7 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 4 | 8 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 4 | 9 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 0 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 1 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 2 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 3 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 4 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 5 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 6 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 7 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 8 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 5 | 9 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 0 | 6 | 0 | | | | - | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

## CODE SHEET

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# Traffic Safety: More than Drinking Driving CounterAttack in British Columbia.

Written for Safety Network, the newsletter of the
Canadian Association of Road Safety Professionals,
November, 1987

Driving while impaired is arguably the single most serious and costly crime committed in Canada. It has been found to be a causal factor in up to 58% of fatal traffic accidents, 17% of injury-producing traffic accidents, and 8% of property damage traffic accidents (Fell, 1983). From a third to a half of the inmates in provincial jails are there because of drinking-driving convictions. Clearly, it is a problem that warrants deep concern and positive action on the part of governments, the private sector, volunteer groups and individuals throughout the country.

However, it seems to me that this issue has taken on such notoriety that other arguably equally serious traffic safety issues have been, to great extent, overlooked by policy makers, educators and researchers in the area. For example, while drinking driving accounts for a high proportion of fatal traffic accidents, in 1986 in British Columbia fatal accidents comprised only 0.45% of all reported accidents and 1.8% of the casualty-producing accidents. Using Fell's (1983) estimates, that leaves over 80% of the casualty-producing traffic accidents and over 90% of the property-damage-only accidents not related to alcohol. From analyses of police-investigated casualty accidents in B.C., causal factors such as failure-to-yield-right-of-way, speeding and driving-without-due-care equal or exceed alcohol as a cause (e.g. Mercer, 1987). Even conceding that Police Traffic Investigation Teams may not produce as valid analyses as, say, Transport Canada Accident Investigation Teams, these figures clearly indicate that drinking driving is not the only important traffic safety issue.

Speculation on how drinking driving became such a paramount traffic safety issue suggests several influences. In the research community, until the recent proliferation of computer-based technology capable of handling massive numbers of accident files, the relatively few and well documented fatal accidents were a prime source of data. The central role of alcohol in fatal accidents may have been generalized to other traffic accident types. Further, the research and research funding infrastructure of foundations (e.g. the Addiction Research Foundation) and ministries (e.g. Health and Welfare Canada) that already existed and had alcohol as a central issue could easily add drinking driving to their list of health-related concerns, while other traffic safety issues such as failure-to-yield-rightof-way had no natural "home".

In addition to research focusing on drinking driving because of technological and funding constraints, the connection of alcohol with traffic accidents can produce a convenient scapegoat. For example, drinking drivers also tend to have a high frequency of non-alcohol-related traffic convictions, tend not to wear restraint devices, and can be conceptualized as much as dangerous drivers as the hapless victims of over-indulgence (e.g. Mercer, 1986; Wilson and Jonah, 1987). Yet blaming alcohol for a traffic accident, rather than a wide range of driving habits and attitudes, paradoxically makes the drinking driver more a victim than a perpetrator. Similarly, a focus on the role of alcohol in accidents reduces the appearance of need for expensive measures such as legislation on more frequent and stringent driver testing and education, and also reduces the appearance of need for legislation for more severe penalties for non-alcohol-related driving offences and the vigorous enforcement of same. Finally, the strong influence of lobby groups such as Mothers Against Drunk Driving cannot be denied when considering the high profile of the drinking-driving issue (Ross, 1984).

Irrespective of the reasons for the current focus on drinking driving, it is the responsibility of traffic safety professionals to ensure that all of the empirically demonstrable dimensions of the traffic crash problem be fully researched, and that the conclusions and recommendations of such research be advocated to the policy makers who can implement countermeasures.

Perhaps it is because British Columbia has been successfully addressing the drinking-driving problem for so long* that other traffic safety issues are increasingly being addressed here. B.C. has always had a strong commitment to basic traffic safety research through the Ministry of Attorney General, the Insurance Corporation of B.C., and the Ministry of Transportation and Highways. Much of this research was made possible through the computerization of both all reported traffic accidents and of all driver records by the Motor Vehicle Department. These data, most stretching back to 1977, allow the analyses of accident trends and characteristics based on complete police accident investigation reports (over 100,000 per year) and full records of drivers' conviction and accident records (over 2.5 million).

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* B.C.'s CounterAttack Program is in its eleventh year and the proportion of alcohol-related casualty traffic accidents has decreased by 50% over the life of the program. The program is based on high visibility enforcement, public education and participation, and research.

While research is absolutely necessary for an intelligent approach to traffic safety, it is not sufficient. In addition it is necessary to have the participation and cooperation of those who can effect change. Again, B.C.'s long and successful experience with the Ministry of Attorney General's drinking-driving CounterAttack Program was influential in establishing the Continuing Committee on Traffic Safety in July, 1982, chaired by that Ministry. The C.C.T.S. was comprised of members representing the Ministries of Transportation and Highways, Consumer and Corporate Affairs (responsible for I.C.B.C.) and Attorney General as well as senior members of the Police community. This committee met every month or two to share information and concerns on traffic safety and to propose and coordinate efforts to reduce the frequency and severity of traffic crashes. In addition to the C.C.T.S., the Police Advisory Committee was formed in September, 1982 as a forum for all middle-management traffic police in the Province to propose and implement traffic enforcement and safety programs on a province-wide basis.

This cooperative and consultative approach to traffic safety among a range of administrative levels, government branches, and organizations culminated this year with the creation of the Cabinet Committee on Traffic Safety comprised of the Minister of Transportation and Highways (chair), the Attorney General, and the Minister of Labour and Consumer Services. In addition to having already increased speeding fines, this committee will tour the province to hear briefs on traffic safety issues.

In future I expect that, while B.C. will not be changing its commitment to reducing drinking-driving accidents, other programs and initiatives will be implemented so that a more complete set of traffic safety issues will be researched and countermeasures developed.

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## APPENDIX A

Canadian Criminal Code and British Columbia Motor Vehicle Act Legislation on Drinking Driving.

## Canadian Criminal Code Legislation

**237.** Every one commits an offence who operates a motor vehicle or vessel or operates or assists in the operation of an aircraft or has the care or control of a motor vehicle, vessel or aircraft whether it is in motion or not,

(a) while his ability to operate vessel or aircraft is impaired by alcohol or a drug; or

(b) having consumed alcohol in such a quantity that the concentration thereof in his blood exceeds eighty milligrams of alcohol in one hundred millitres of blood.

**238.** (1) In this section and sections 239 to 241,

"analyst" means a person designated by the Attorney General as an analyst for the purposes of section 241;

"approved container" means

(a) in respect of breath samples, a container of a kind that is designed to receive a sample of the breath of a person for analysis and is approved as suitable for the purposes of section 241 by order of the Attorney General of Canada; and

(b) in respect of blood samples, a container of a kind that is designed to receive a sample of the blood of a person for analysis and is approved as suitable for the purposes of section 241 by order of the Attorney General of Canada;

"approved instrument" means an instrument of a kind that is designed to receive and make an analysis of a sample of the breath of a person in order to measure the concentration of alcohol in the blood of that person and is approved as suitable for the purposes of section 241 by order of the Attorney General of Canada;

"approved screening device" means a device of a kind that is designed to ascertain the presence of alcohol in the blood of a person and that is approved for the purposes of this section by order of the Attorney General of Canada;

"qualified medical practitioner" means a person duly qualified by provincial law to practise medicine;

"qualified technician means,

(a) in respect of breath samples, a person designated by the Attorney General as being qualified to operate an approved instrument, and

(b) in respect of blood samples, any person or person of a class of persons designated by the Attorney General as being qualified to take samples of blood for the purposes of this section and sections 240 and 241.

## Canadian Criminal Code Legislation

(2) Where a peace officer reasonably suspects that a person who is operating a motor vehicle or vessel or operating or assisting in the operation of an aircraft or who has the care or control of a motor vehicle, vessel or aircraft, whether it is in motion or not, has alcohol in his body, he may, by demand made to that person, require him to provide forthwith such a sample of his breath as in the opinion of the peace officer is necessary to enable a proper analysis of his breath to be made by means of an approved screening device and, where necessary, to accompany the peace officer for the purpose of enabling such a sample of his breath to be taken.

(3) Where a peace officer believes on reasonable and probable grounds that a person is committing, or at any time within the preceding two hours has committed, as a result of the consumption of alcohol, an offence under section 237, he may, by demand made to that person forthwith or as soon as practicable, require him to provide then or as soon thereafter as is practicable

(a) such samples of his breath as in the opinion of a qualified technician, or

(b) where the peace officer has reasonable and probable grounds to believe that, by reason of any physical condition of the person,

(i) the person may be incapable of providing a sample of his breath, or

(ii) it would be impracticable to obtain a sample of his breath,

such samples of his blood, under the conditions referred to in subsection (4), as in the opinion of the qualified medical practitioner or qualified technician taking the samples

are necessary to enable proper analysis to be made in order to determine the concentration, if any, of alcohol in his blood, and to accompany the peace officer for the purpose of enabling such samples to be taken.

(4) Samples of blood may only be taken from a person pursuant to a demand made by a peace officer under subsection (3) if the samples are taken by or under the direction of a qualified medical practitioner and the qualified medical practitioner is satisfied that the taking of such samples would not endanger the life or health of the person.

(5) Every one commits an offence who, without reasonable excuse, fails or refuses to comply with a demand made to him by a peace officer under this section.

(6) Where a person is convicted or discharged under section 662.1 of an offence committed under subsection (5) for a failure or refusal to comply with a demand made under subsection (3)(a) or (b) in respect of any transaction, he shall not be convicted or discharged under section 662.1 of another offence committed under subsection (5) in respect of the same transaction.

## Canadian Criminal Code Legislation

**239.** (1) Every one who commits an offence under section 237 or 238 is guilty of an indictable offence or an offence punishable on summary conviction and is liable,

(a) whether the offence is prosecuted by indictment or punishable on summary conviction, to the following minimum punishment, namely,

(i) for a first offence, to a fine of not less than three hundred dollars,

(ii) for a second offence, to imprisonment for not less than fourteen days, and

(iii) for each subsequent offence, to imprisonment for not less than ninety days;

(b) where the offence is prosecuted by indictment, to imprisonment for a term not exceeding five years; and

(c) where the offence is punishable on summary conviction, to imprisonment for a term not exceeding six months.

(2) Every one who commits an offence under paragraph 237(a) and thereby causes bodily harm to any other person is guilty of an indictable offence and is liable to imprisonment for a term not exceeding ten years.

(3) Every one who commits an offence under paragraph 237(a) and thereby causes the death of any other person is guilty of an indictable offence and is liable to imprisonment for a term not exceeding fourteen years.

(4) Where a person is convicted of an offence committed under paragraph 237(a) or (b) or subsection 238(5), he shall, for the purposes of this Act, be deemed to be convicted for a second or subsequent offence, as the case may be, if he has previously been convicted of

(a) an offence committed under any of those provisions;

(b) an offence under subsection 239(2) or (3); or

(c) an offence under section 234, 234.1, 235, 236, 240.1, or 240.2 or subsection 240(4) of this Act as this Act read immediately before the coming into force of this subsection.

(5) Nothwithstanding subsection 662.1(1), a court may, instead of convicting a person of an offence committed under section 237, after hearing medical or other evidence, if it considers that the person is in need of curative treatment in relation to his consumption of alcohol or drugs and that it would not be contrary to the public interest, by order direct that the person be discharged under section 662.1 on the conditions prescribed in a probation order, including a condition respecting his attendance for curative treatment in relation to his consumption of alcohol or drugs.

## British Columbia Motor Vehicle Act Sections

### 24 hour prohibition

**214.** (1) In this section "driver" includes a person having the care or control of a motor vehicle on a highway or industrial road whether or not the motor vehicle is in motion.

(2) A peace officer may, at any time or place on a highway or industrial road when he has reason to suspect that the driver of a motor vehicle has consumed alcohol, request the driver to drive the motor vehicle, under the directon of the peace officer, to the nearest place off the travelled portion of the highway or industrial road and there to surrender his driver's licence.

(3) A peace officer may, at any time or place on a highway or industrial road when he believes that a driver's ability to drive a motor vehicle is affected by a drug, other than alcohol, request the driver to drive the motor vehicle, under the direction of the peace officer, to the nearest place off the travelled portion of the highway or industrial road and there to surrender his driver's licence.

(4) Where a peace officer requests a driver to surrender his driver's licence under this section, the driver shall forthwith surrender to the peace officer his driver's licence issued under this Act or any document issued in another jurisdiction that allows him to drive or operate a motor vehicle.

(5) Unless the prohibition from driving a motor vehicle is terminated under subsection (6),(7), or (8), the driver is automatically prohibited from driving a motor vehicle for a period of 24 hours from the time the peace officer requested the surrender of the driver's licence.

(6) Where a driver, who is requested to surrender his driver's licence under subsection (2), forthwith requests the peace officer to administer and does undergo as soon as practicable a test that indicates that his blood alcohol level does not exceed 50 mg. of alcohol in 100 mL. of blood, the prohibition from driving is terminated.

(7) Where a driver who is requested to surrender his driver's licence under subsection (2) produces, to a peace officer having charge of the matter, a certificate of a medical practitioner that

(a) states that the blood alcohol level of the driver did not exceed 50 mg. of alcohol in 100 ml. of blood at the time the certificate was signed, and

(b) was signed after he was prohibited from driving,

the prohibition is terminated.

(8) Where a driver, who is requested to surrender his driver's licence under subsection (3), satisfies a peace officer having charge of the matter that his ability to drive a motor vehicle is not affected by a drug, other than alcohol, the prohibition from driving is terminated.

(9) A peace officer acting under subsection (2) need not hold the opinion that the blood alcohol level of the driver exceeds 50 mg. of alcohol in 100 mL. of blood.

## British Columbia Motor Vehicle Act Sections

(10) Where a peace officer prohibits a person from driving a motor vehicle under this section, the peace officer shall cause a report of the prohibition to be delivered to the superintendent unless the prohibition from driving a motor vehicle is terminated under subsection (6).

(11) The report referred to in subsection (10) shall be in a form established by the superintendent.

1982-36-32, proclaimed effective September 1, 1982

### Driving with more than 80 milligrams of alcohol in blood.

**220.1** (1) Everyone who, on a highway or industrial road, drives a motor vehicle or has the care or control of a motor vehicle, whether it is in motion or not, having consumed alcohol in such a quantity that the proportion thereof in his blood exceeds 80 milligrams of alcohol in 100 millilitres of blood, commits an offence and is liable on conviction to a fine of not less than $100 and not more than $2,000 or to imprisonment for not less than 7 days and not more than 6 months, or both.

(2) A person who is convicted of an offence under subsection (1) is automatically and without notice prohibited from driving a motor vehicle for 6 months provided under section 92.

1982-73-2, proclaimed effective October 1, 1983

### Demand for blood sample

**220.2** (1) Where a peace officer on reasonable and probable grounds believes that a person has,

(a) within the preceding 2 hours, driven a motor vehicle or had the care or control of a motor vehicle on a highway or industrial road, and

(b) consumed alcohol,

he may, by demand made to that person forthwith or as soon as practicable, require him to provide then or as soon thereafter as is practicable a sufficient sample of his blood, as in the opinion of the person taking the sample is necessary, to enable a proper analysis to be made in order to determine the proportion, if any, of alcohol in his blood, and to accompany the peace officer for the purpose of enabling that sample to be taken.

(2) Where the person referred to in subsection (1) is incapable, due to physical or mental trauma, of comprehending the nature of a demand under subsection (1), a sufficient sample of his blood, as in the opinion of the person taking the sample is necessary, to enable a proper analysis to be made in order to determine the proportion, if any, of alcohol in his blood, may be taken from that person without a demand being made under subsection (1).

(3) A blood sample may be taken under this section only by a person or a class of persons approved by order of the Attorney General, a medical practitioner or a registered nurse within the meaning of the Nurses (Registered) Act.

(4) A blood sample taken under this section may only be analyzed by a person or class of persons approved by order of the Attorney General using a method approved as suitable for the purposes of this section by order of the Attorney General.

1982-73-2, proclaimed effective October 1, 1983

## Refusal to give a blood sample

**220.3** (1) A person who without reasonable excuse fails or refuses to comply with a demand made under section 220.2(1) commits an offence and is liable on conviction to a fine of not less than $100 and not more than $2,000 or to imprisonment for not less than 7 days and not more than 6 months, or both.

(2) A person who is convicted of an offence under subsection (1) is automatically and without notice prohibited from driving a motor vehicle for 6 months as provided under section 92.

1982-73-2, proclaimed effective October 1, 1983

## Proof of blood sample

**220.4** (1) In a proceeding under section 220.1, where a blood sample of the defendant was taken

(a) pursuant to a demand made under section 220.2(1) or pursuant to section 220.2(2), and

(b) as soon as practicable after the time when the offence was alleged to have been committed and in any event no later than 2 hours after that time,

evidence of the result of an analysis of the blood sample is, in the absence of any evidence to the contrary, proof of the proportion of alcohol in the blood of the defendant at the time when the offence was alleged to have been committed.

(2) In a proceeding under section 220.1, where a blood sample of the defendant was taken pursuant to a demand made under section 220.2(1) or pursuant to section 220.2(2), a certificate of a person referred to in section 220.2(3) or (4) stating that he has

(a) taken the blood sample of the defendant, or

(b) made an analysis of the blood sample of the defendant and stating the result of his analysis

is evidence of the statements contained in the certificate without proof of the signature of the person appearing to have signed the certificate.

## British Columbia Motor Vehicle Act Sections

(3) In a proceeding under section 220.1, where a blood sample of the defendant was taken pursuant to section 220.2(2), a certificate of a medical practitioner stating that, in his opinion, at the time the blood sample was taken the defendant was incapable, due to physical or mental trauma, of comprehending the nature of a demand under section 220.2(1) is evidence of the statements contained in the certificate without proof of the signature of the person appearing to have signed the certificate.

(4) In a proceeding under section 220.1, where a blood sample of the defendant was taken pursuant to a demand made under section 220.1(1) or pursuant to section 220.2(2), the proportion of alcohol in the blood sample of the defendant at the time of the analysis shall be deemed to be the same as the proportion of alcohol in the blood of the defendant when the sample was taken, unless the defendant proves otherwise.

(5) A defendant against whom a certificate described in subsection (2) or (3) is produced may, with leave of the court, require the attendance of the person who made the certificate for the purposes of cross examination.

(6) No certificate shall be received in evidence pursuant to subsection (2) or (3) unless, before the trial, the defendant has received reasonable notice that the certificate will be introduced and has received a copy of the certificate.

(7) The Lieutenant Governor in Council may prescribe the form and content of certificates to be used in this section.

1982-73-2, proclaimed effective October 1, 1983

### Civil liability

**220.5** (1) No action lies, for damages or otherwise, against any person as a result of the taking or analyzing of a blood sample under section 220.2 except an action for damages arising out of negligence in technical procedures used in taking the blood.

1982-73-2, proclaimed October 1, 1983

### No legal obligation

**220.6** Nothwithstanding anything in section 220.1 to 220.5, a person authorized to take a blood sample under section 220.2(3) may decline to take a blood sample from a person where to do so would, in the opinion of a medical practitioner, endanger the person's health or life.

1982-73-2, proclaimed October 1, 1983

## British Columbia Motor Vehicle Act Sections

### Prohibition against driving by court

**90.** (1) For the purpose of this section, "convicts" includes the granting of an absolute or conditional discharge,

(2) Where a court convicts a person of an offence under

(a) this Act or the regulations

(b) sections 233, 234, 235, or 236 of the Criminal Code, or

(c) section 203, 204, 219 of the Criminal Code where the section was contravened by means of a motor vehicle,

the court may

(d) consider the person's driving record, and

(e) notwithstanding that the person is or may be subject to another prohibition from driving, prohibit the person from driving a motor vehicle for a definite period of time if the court considers that the facts of the case or the person's driving record or both the facts of the case and his driving record when taken together justify the prohibition.

(3) Subsection (2) does not apply

(a) where neither the defendant nor his agent or counsel appears before the court at the time of conviction, or

(b) where the defendant is convicted of an offence under section 76.

(4) Where a court prohibits a person from driving a motor vehicle under this section, the court shall order that the prohibition

(a) take effect immediately

(b) continue for the full day of each day of the prohibition, and

(c) continue for consecutive days.

(5) A person who is prohibited from driving a motor vehicle under this section for a period of more than 3 years, may make an application to the court that prohibited him from driving for a review of the length of the prohibition, after 3 years of the prohibition have elapsed and after notifying the superintendent.

(6) On an application under subsection (5), the court may, where it considers that it is not contrary to public interest, reduce the length of the prohibition or cancel the prohibition.

(7) Where the court reduces the length of a prohibition or cancels a prohibition under subsection (6), it shall forthwith notify the superintendent of its decision.

1982-36-19, proclaimed effective September 1, 1982; 1984-30-51, effective June 11, 1984 (B.C. Reg. 165/84);[amended 1985-52-29, not in force, amendment not included]

## British Columbia Motor Vehicle Act Sections

**91.** [Repealed 1982-36-19, proclaimed effective September 1, 1982] [Re-enacted 1982-36-19, to be proclaimed]

### Automatic prohibition against driving on conviction

**92.** (1) For the purpose of this section, "convicted" includes the granting of an absolute or conditional discharge.

(2) A person who is convicted of an offence under

(a) section 88, 94, 220.1(1) or 220.3(1),

(b) section 233, 234, 235, or 236 of the Criminal Code, or

(c) section 203, 204, 219 of the Criminal Code where the section was contravened by means of a motor vehicle

is automatically and without notice prohibited from driving a motor vehicle for 6 months from the date of sentencing, the date that the passing of sentence is suspended, the date of being granted an absolute or conditional discharge or the date a court makes a disposition under the Young Offenders Act (Canada) or the Young Offenders Act (British Columbia)

(3) Subsection (2) does not apply where neither the defendant nor his agent or counsel appear before the court at the time of conviction.

1982-36-19, proclaimed effective September 1, 1982; 1982-73-1, proclaimed effective October 1, 1983; 1984-30-52,53, effective June 11, 1984 (B.C. Reg. 165/84; [amended 1985-52-60, not in force, amendment not included)

# APPENDIX B

Executive Summary of CounterAttack Traffic Research Papers, 1986. Ministry of Attorney General, British Columbia, 1987.

# EXECUTIVE SUMMARY

## TRAFFIC CONVICTIONS AND TRAFFIC ACCIDENTS

### Frequency, Types and Patterns of Traffic Convictions and Frequency and Type of Traffic Accidents

These analyses show that a relatively high traffic violation conviction count and relatively frequent and severe traffic accidents are associated with the demographic characteristics of being male and under 30 years of age, and that a relatively small proportion of the drivers (5%) are having a relatively large proportion of the reported accidents (44%).

A factor analytic examination of the pattern and frequency of nine common traffic violations revealed two separate but closely related factors: a "reckless driving" factor marked by speeding, disobeying stop sign, disobeying signs or signals, disobeying red light and speeding in a school zone convictions; and a "drinking-driving" factor marked by 24 hour drinking-driving licence suspension, drinking-driving criminal convictions, excess speed for conditions and speeding convictions. High scores on these factors related to the driver being male and under 30 years of age, to having had relatively frequent traffic accidents and to having had relatively severe traffic accidents. Further, both factors were positively related to traffic accident frequency when the effects of driver age were removed.

The emergence of a reckless driving violation pattern and a drinking-driving violation pattern and their strong relationship to both traffic accident frequency and severity leads to a number of conclusions: First, in addition to following closely in traffic (Evans and Wasielewski, 1982), the driving behaviours loading on the factors can be argued to represent a high-risk driving style that involves speeding, ignoring traffic signs and signals (e.g. red lights, stop signs) and drinking driving.

Second, the existence of a reckless driving factor that is distinct from the drinking driving factor and that is equally predictive of accident involvement allows a wider base of violations to be used to identify high-risk drivers. Thus, not only convicted drinking drivers, but any driver with a violation pattern that resulted in a high score on either the reckless driving or drinking-driving factor could be considered as a high-risk driver. Legislation could thus be considered that would require these drivers to take remedial driver training, and that training ought to relate to all aspects of traffic safety as opposed to focussing on alcohol-related topics.

Finally, the close relationship between the reckless driving factor and the drinking-driving factor argues for the existence of an overall high-risk driving style that includes but is not limited to drinking driving.

### Traffic Accident Frequency, Traffic Convictions, Driver Age and Driver Gender. British Columbia, June 1980 - December 1984.

The results of these analyses suggest that a relatively small proportion of the drivers (5%) are having a relatively large proportion of the traffic accidents (44%), and that these drivers tend to be young males. In terms of traffic-related convictions, those with frequent accidents have a record of frequent convictions, especially convictions having to do with speeding and intersection behaviours (e.g. red light, yellow light, stop sign). In addition, they are more likely to not wear seat belts, to not be able to produce a valid driver's licence, and to be driving uninsured.

## TRAFFIC ACCIDENT TYPES

### Fatality-Producing vs. Injury-Only Traffic Accidents: Trends, Characteristics, Persons Involved, and Consequences. British Columbia, 1985

To summarize, the proportion of fatality-producing to injury-only casualty traffic accidents has gradually declined over the past 10 years to a 1985-86 level of 1.7%, with the highest seasonal proportion occurring during the summer months. While the charge history of drivers in injury-only accidents is similar to that of drivers in fatal accidents (Mercer, 1986), accident characteristics and other driver characteristics differ between the typical fatal and typical injury-only traffic accident.

From these analyses the typical fatal accident in B.C. in 1985 occurred on a rural, high-speed road in the dark on a weekend. It most likely involved a single vehicle that either failed to negotiate a curve, or simply ran off the side of a straight road while if a second vehicle was involved there was often a head-on collision. The most frequent contributing factors to the accident were excessive speed and/or alcohol.

Drivers in fatal accidents were most frequently male (80%). About 45% of the male drivers 34 years of age or older carried passengers, and the passengers were slightly more likely to be male than female, while half of the younger male drivers carried passengers and the passengers were much more likely to be male than female. On the other hand, about 56% of both younger and older female drivers in fatal accidents carried passengers, and the passengers were much more likely to be female than male. Further, occupants of vehicles driven by males were less likely to wear restraint devices than were occupants in vehicles driven by females. Finally, the average age of male victims in fatal accidents was 33 years and female victims was 39 years.

In contrast, a typical injury-only accident occurred on an urban, 50 kph road in the daylight during the evening "rush hours". It most likely involved one vehicle which rear-ended or struck another vehicle at 90° at an intersection. The most frequent contributing factors were driving without due care and/or failure to yield the right of way.

There was a higher proportion of female drivers in injury-only accidents than in fatal accidents, although the majority of drivers in injury-only accidents (70%) were male. Overall, drivers in injury-only accidents were less likely to carry passengers than were drivers in fatal accidents. A third of the male drivers 34 years of age or older carried passengers and the passengers were slightly more likely to male than female, while 39% of the younger male drivers carried passengers and the passengers were appreciably more likely to be male. On the other hand, while fewer of the older female drivers carried passengers than did the younger female drivers, in all cases the passengers were more likely to be female than male. Restraint device use rates were similar for occupants of vehicles driven by males as for vehicles driven by females. Finally, the average victim age for both males and females in these injury-only accidents was less than for victims of fatal accidents, with an average male victim age of 30 years and an average female victim age of 33 years.

Admittedly, every traffic accident is unique, and within both the fatal and injury-only categories there are a number of subsets that have not been addressed (e.g. pedestrian, commercial vehicle, motorcycle). However, in order to design countermeasures and identify target groups, accident types need to be characterized. Indeed, the young male drinking driver in a high-speed, night-time, single-vehicle crash is a well-recognized central figure in fatal accidents. However, when injury-only casualty accidents are contrasted with fatal accidents, other important and exponentially more common accident configurations emerge. For example, the female driver becomes a very significant factor, accounting for almost a third of the drivers in injury-only accidents, while the older male driver with no passengers going through intersections during "rush hours" also gains in importance. Also of central importance in injury-only accidents are the contributing factors of carelessness and failure to yield, and the daytime and during the week as accident times.

It follows that to further reduce traffic accident frequencies, educators and policy-makers might expand public education programs and police enforcement priorities to more comprehensively address the full range of target groups and casualty accident types.

## Intersection Casualty Accidents: Trends, Characteristics, Persons Involved, and Consequences. British Columbia, 1985

To summarize, 42% to 46% of all casualty accidents in B.C. occurred where one road crossed another, with the highest number and lowest proportion occurring during the summer months. They happened most frequently in business and shopping areas, especially during the evening "rush hours". They tended to occur in daylight or in good artificial lighting and primarily in good weather, although about a third occurred in wet conditions.

Turning to the traffic control devices at the accident scene, a third of the casualty intersection accidents occurred where there were no traffic signs or signals, a third where there were stop signs, and a third where there were stop lights. Of the latter, 45% occurred on a red light, 45% on a green light, and 10% on an amber light. It is noteworthy that, contrary perhaps to the popular impression, only 3% of all intersection casualty accidents occurred on an amber light and 14% on a red light, leaving 83% not associated with automatic traffic signal violations.

Over 80% of these intersection casualty accidents were multiple-vehicle accidents, with only 9% involving pedestrians and 8% involving bicycles. In 43% of the instances one vehicle struck the other at a 90° angle, while 28% involved rear-end collisions. The causes included Failure to Yield the Right of Way (29%), Driving Without Due Care (25%), Unsafe Speed (10%) and Alcohol (9%).

Comparing intersection casualty accidents to non-intersection casualty accidents, the drivers in intersection accidents were older (average age 35 years), carried fewer passengers (65% carried no passengers), and reported a higher frequency of restraint device use. While 67% of the drivers in these accidents were male, half of all male drivers and over half of all female drivers who had casualty traffic accidents in 1985 had them at intersections. The male drivers in these accidents reported lower restraint device use in their vehicles and carried older passengers than did the female drivers. Overall, intersection casualty accidents produced a lower proportion of fatalities and less severe injuries than did non-intersection casualty accidents.

In terms of countermeasures, high-visibility police enforcement campaigns at controlled intersections has shown promise as a way to reduce, at least for the duration of the campaign, driving behaviours that could lead to traffic accidents (Mercer, 1986). However, as two-thirds of intersection accidents occurred at intersections with no traffic signs or signals, or at intersections with only stop signs, and as these sorts of intersections are far too numerous to be included in targetted intersection enforcement campaigns, it follows that driver education dealing with right-of-way and driver courtesy may help to reduce these accidents. Further, as a high proportion of intersection casualty accidents involve rear-end collisions, driver education on following distances might be considered.

The target groups for such education materials ought to focus on adult drivers carrying no passengers who are on the road during "rush hours", and on adult female drivers carrying young passengers. Themes that could prove useful might include the notion of not carrying the day's work stress over into the task of driving home, of responsibility to those waiting at home, and, especially for the female driver, responsibility for her young passengers.

Finally, unlike the speed-and-alcohol traffic accidents that tend not to occur at intersections, intersection casualty accidents appear to be less of a product of "lifestyle" and more of a product of inattention, discourtesy, and perhaps ignorance of the basic rules of the road. Consequently, with a combination of public education and police enforcement programs, there is reason to hope that these accidents could be successfully reduced.

### Aspects of Weather-Related Casualty Traffic Accidents, British Columbia, 1984

In 1984 the 2,587 reported weather-related casualty traffic accidents in British Columbia comprised 11.1% of all casualty traffic accidents, caused 3,270 injuries and 48 deaths, and cost the Insurance Corporation of B.C. approximately $52.6 million in insurance payments for medical and other damages. Weather was the fifth most frequently cited cause of casualty traffic accidents, following Driving Without Due Care (29.1%), Failure to Yield Right of Way (17.5%), Alcohol Involvement (15.2%), and Excessive Speed (15.2%), and in sum totalled nearly the number of pedestrian and motorcycle casualty accidents combined.

In many ways the typical weather-related casualty traffic accident resembles the typical alcohol-related casualty traffic accident: both are high-speed single-vehicle runoffs that occur at night at a curve in the road in rural areas and involve young male drivers. The differences between them are that in the one instance the driver's ability is impaired by the driving conditions (rain, snow, ice) and in the other instance the driver's ability is impaired by alcohol.

Finally, it must be stressed that these casualties must not be treated as if there is nothing that can be done to reduce their number and the attendant expense to the province. Short-term, high-intensity public education during periods of elevated risk can reduce alcohol-related accidents, and there is no compelling reason to assume that the same cannot be accomplished with regard to weather-related accidents. Educational programs and campaigns, combined with improved road surface management, have the potential to significantly reduce weather-related casualty traffic accidents in British Columbia.

## CAUSES OF FATAL TRAFFIC ACCIDENTS

### Coroner and Police (MV104) Accident Cause Frequencies, British Columbia, 1984

A comparison of police (MV104) and coroner reports on the causes of fatal traffic accidents in British Columbia in 1984 revealed substantial differences between the two data sets. Generally, the police portrayed these accidents as primarily the driver's fault, in terms of dangerous and illegal driving behaviours, with a high proportion of the accidents being alcohol-related. On the other hand, coroners' reports tended to characterize these fatalities as more of a product of circumstances, less as the driver's fault, and less as a consequence of alcohol impairment.

As the police have more experience in accident investigation and have standardized accident investigation protocols and forms, it is likely their data are more reliable than the coroners' written text. However, the difference between these two perspectives needs further investigation. Consequently it is recommended that similar fatal accident protocols and forms be developed for each group so that their perceptions of fatal traffic accident causes can be more accurately compared and agreement on the probable causes achieved.

### The Measurement of the Contribution of Alcohol to Fatal Traffic Accidents, British Columbia, 1984.

The relationships among police accident report data, coroner data and Blood Alcohol Content (BAC) levels is examined for a set of fatal traffic accidents. The problems with each data source are discussed and the first step in designing a system combining these sources is suggested.

## TRAFFIC ACCIDENT EPIDEMIOLOGY

### A Brief Comparison of Injury and Fatal Traffic Accidents for the First Half of 1985 with those for the First Half of 1986

This paper presents driver/passenger information, locations, contributing factors, and collision types for injury and fatal accidents.

### Contributing Factors to Casualty Motor Vehicle Crashes in British Columbia, 1985

This is a tabular presentation of some of the primary causes of casualty traffic accidents broken down by police reporting detachments.

### The Percentage of Injuries and Deaths Associated with Drinking Driving by Police Jurisdiction: British Columbia, 1985

This report lists, for each police reporting jurisdiction, the number of persons injured and the percentage of those who were injured in alcohol-related traffic accidents. In addition, similar information is presented for fatalities.

### Locations of Casualty Motor Vehicle Crashes in British Columbia, 1985

This is a tabular presentation of the locations of casualty traffic accidents (e.g. intersection, bridge) broken down by police reporting detachments.

### Types of Casualty Motor Vehicle Crashes in British Columbia, 1985

This is a tabular presentation of the types of casualty accidents (e.g. vehicle-pedestrian, commercial vehicle) by police reporting detachments.